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Improved "Coasting" Sled.

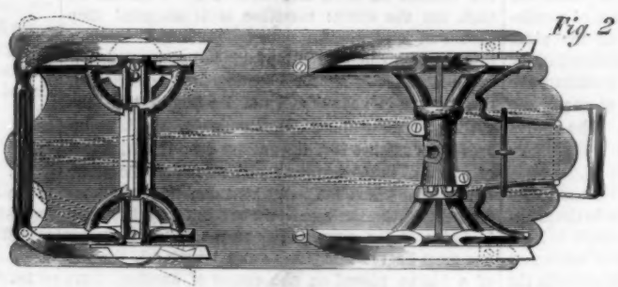
There is no more exhilarating winter pastime than sliding down hill, or "coasting," as Boston and New Brunswick people call it. The phrase is doubtless derived from the Acadians, who use the old French language in which *coteé* or *coste* signifies hill-side. Old and young pursue it with the utmost zest, and a heavy fall of snow is anxiously looked for where the natural facilities are good for this sport. Not unfrequently, however, terrible accidents occur from carelessness or mismanagement, and broken heads or fractured limbs, caused by sleds colliding with each other or with obstructions, are by no means uncommon. It is superfluous to say that the possibility of danger very much detracts from the pleasure, and the prospect of being jumped upon by an over-loaded, mismanaged sled, or turned over by one's own awkwardness, deters very many from seeking the hill-side.

If people would only use the sled here shown there would be fewer accidents from mismanagement, for the track can be kept and the sled steered to avoid obstructions as easily as a horse is guided, and in much the same way. The reader will see two ropes, A and B, which the boy is holding, these ropes run in opposite directions, after they pass through the holes, C, so that by drawing on A, the forward runners are turned to the left, thus diverting the whole body of the sled in the direction desired. The arrangement of the runners is shown in Fig. 2; the forward runners being pivoted at D so that they turn freely; the ends are connected by the crossbar, E, through which the steering lines pass.

At the back of the rider is a spring brake, E, which, when leaned against, throws the points, F, into the snow and checks the progress immediately. A convenient brace, G, forward is provided for the feet to rest against. This seems to be an excellent sled, and we doubt not that boys and children of a larger growth will be exceedingly pleased with it. It was invented by H. C. Hunt, of Amboy, Lee county, Ill., and a patent is now pending through the Scientific American Patent Agency. For further information address the inventor as above.

Fig. 1

Fig. 2



HUNT'S "COASTING" SLED.

Checking Perspiration.

If while perspiring, or while something warmer than usual, from exercise or a heated room, there is a sudden exposure in stillness to a still, cold air, or to a raw, damp atmosphere, or to a draught, whether at an open window or door or street-corner, an inevitable result is a violent and instantaneous closing of the pores of the skin, by which waste and impure matters, which were making their way out of the system, are compelled to seek an exit through some other channel, and break through some weaker part, not the natural one, and harm to that part is the result. The idea is presented by saying that the cold has settled in that part. To illustrate: A lady was about getting into a small boat to cross the Delaware; but wishing first to get an orange at a fruit-stand, she ran up the bank of the river, and on her return to the boat found herself much heated, for it was summer, but there was a little wind on the water, and the clothing soon felt cold to her; the next morning she had a severe cold, which settled on her lungs, and within the year she died of consumption. A stout, strong man was working in a garden in May; feeling a little tired about noon, he sat down in the shade of the house and fell asleep; he waked up chilly; inflammation of the lungs followed, ending, after two years of great suffering, in consumption. On opening his chest, there was such an extensive decay that the matter was scooped out by the cupful.

A Boston ship-owner, while on the deck of one of his vessels, thought he would "lend a hand" in some emergency; and pulling off his coat, worked with a will, until he perspired freely, when he sat down to rest awhile, enjoying the delicious breeze from the sea. On attempting to rise, he found himself unable, and was so stiff in his joints, that he had to be carried home and put to bed, which he did not leave until the end of two years, when he was barely able to hobble down to the wharf on crutches. A lady, after being unusually busy all day, found herself heated and tired toward sundown of a summer's day. She concluded she would rest herself by taking a drive to town in an open vehicle. The ride made her uncomfortably cool, but she warmed herself up by an hour's shopping, when she turned homeward; it being late in the evening, she found herself more decidedly chilly than before. At midnight she had pneumonia (inflammation of the lungs), and in three months had the ordinary symptoms of confirmed consumption. A lady of great energy of character lost her cook, and had to take her place for four days; the kitchen was warm, and there was a draft of air through it. When the work was done, warm and weary, she went to her chamber, and laid down on the bed to rest herself. This operation was repeated several times a day. On the fifth day she had an attack of lung fever; at the end of six months she was barely able to leave her chamber, only to find herself suffering with all the more prominent symptoms of confirmed consumption; such as quick pulse, night and morning cough, night-sweats, debility, short breath, and falling away.

A young lady rose from her bed on a November night, and leaned her arm on the cold window-sill to listen to a serenade. Next morning she had pneumonia, and suffered the horrors of asthma for the remainder of a long life. Multitudes of women lose health and life every year, in one of two ways; by busying themselves in a warm kitchen until weary, and then throwing themselves on a bed or sofa, without covering, and perhaps in a room without fire; or by removing the outer clothing, and perhaps changing the dress for a more common one, as soon as they enter the house after a walk or a shopping. The rule should be invariable to go at once to a warm room and keep on all the clothing at least for five or ten minutes, until the forehead is perfectly dry. In all weathers, if you have to walk and ride on any occasion, do the riding first.—*Hall's Journal o Health.*

To Prevent Prints from Fading.

The dress should be washed in lather, and not by applying the soap in the usual way direct upon the muslin. Make a lather by boiling soap and water together; let it stand until it is sufficiently cool for use, and previously to putting the dress into it, throw in a handful of salt; rinse the dress without wringing it, in clear, cold water, into which a little salt has been thrown; remove it and rinse it in a fresh supply of clear water and salt. Then wring the dress in a cloth and hang it to dry immediately, spreading as open as possible, so as to prevent one part lying over another. Should there be any white in the pattern, mix a little blue in the water.

THE great drought prevailing in this country extends over England also.

THE MANUFACTURE OF "GREENBACKS."

The following description of the mode of manufacturing Government money appears in the Washington correspondence of the Cincinnati *Gazette*:—

To obtain access to the note-printing bureau requires a pass from the Secretary of the Treasury himself. For obvious reasons, it is a privilege rarely granted, and never except under the most thorough surveillance. No lady not employed upon the work is ever permitted, under any circumstances, to enter that part of the department. If for no other reason, the crowded machinery would make it dangerous.

THE MACHINE-SHOP

is the first room we enter. It is supplied with forges, lathes, planes and drills, capable of doing all the repairing necessary to be done to the machinery of the building, and to the setting-up and working of such new machines as are demanded by our extensive paper circulation.

THE PAPER MILL,

though not as extensive as one for general manufacturing, is sufficient for all the labor required in making the note-printing paper.

The manufacture of a paper combining the qualities of wear, and being splitless and unphotographic, was a much desired desideratum. Accordingly, it was resolved to make some experiments, which were entrusted to Doctor Gwynn. He has produced a paper as firm as parchment, smooth as satin, and of a combination of materials known only to himself, and secured to the exclusive use of the Government. He has introduced into it a fiber which cannot be photographed without discoloring the paper to which impressions may be transferred, giving it the appearance of a coarse, black spider-web. Being molded into the body of the paper, it is impossible to erase it, and it must be a great preventive of counterfeiting by the photographic process, which has lately been the most successful.

THE INK MILLS

are six in number, for making as many different colors. Each one is called a four-horse-power mill, though the whole six are driven at the same time by an engine which one could pick up with one hand. It not only turns these mills, but at the same time runs three Hoe-cylinder presses. It was made in the machine shop of the department, and derives its force from its great boiler capacity.

THE ENGRAVING ROOM

is of more interest than any we have yet been in. Here science and art are both displayed to perfection. There is, perhaps, no engraving so fine and requiring so much time to execute as that on the plate now being prepared for national note-printing. One, the size of a bill, on which the workman has been employed almost a year, is a copy of one of the paintings in the rotunda of the Capitol. The figures were of exquisite proportions, and the water-lines, though plain, extremely delicate in their tracery.

With the single plate, as it comes from the hands of the engraver, it would be impossible to do the printing required, and, as it is equally impossible to have a number of plates engraved, it becomes necessary to repeat them in another way. This is done in the following manner:—The engraving is done on a plate of soft steel just the size of the bill or bond, and the cuttings are indentations. When finished, the plate is hardened and taken to a "transfer press," where a roller of soft steel, just of a circumference to take in the size of the plate, is rolled over it, under heavy pressure, leaving the impression on the roller in a raised form. This roller is in turn hardened, and then any number of flat plates similar to the original are prepared, and receive in like manner the impression from this roller, and become *fac-similes* of the plate engraved; and we have produced in a few minutes what it has taken months with chisel and eye-glass to make!

THE PRINTING

is now done on the old-fashioned engraver's press, being nothing more than a simple iron roller, covered with cloth and paper, to press the printing paper into the indentures, placed in a strong frame, and turned back and forth by hand, by spokes placed in the end of the roller. Two persons work at each press, a man and woman, the former attending the plate, the latter the paper. The plate is kept warm while working, by a gas heater. The sheets, when printed, are each laid between other sheets of thin brown paper, to keep them from blurring, and sent in hundreds to the drying-room. The first process of bond-printing is numbering the coupons and the denomination with a yellow mordant, and as they fly from the press they are bronzed, as they appear when issued.

Yellow is used because it cannot be photographed without showing too plainly to be mistaken, as was remarked about the fiber in the paper. This discovery was made in the following manner:—When Mr. Clark was at the head of the Bureau of Construction, he had a map made for military purposes, which it was necessary to repeat. It was photographed, and an obscure road marked with a faint yellow line was discovered to be black in the copies. He then photographed a specimen sheet of inks or paints, and, of all the colors, except black, yellow was the only one which might not have been altered with ease with a touch of the brush. It was black as the black ink itself. Hence any attempt to photograph this color will only lead to the discovery—and, as it is the ground-work of bonds and other securities, and covered by the printing, it seems another security against fraud.

THE SERIES-NUMBERING

is the last process before trimming. The work is done by women, the machines being worked by a treadle. The figures are placed in the edges of six disks, placed side by side, and fastened to an arm worked by the treadle, something after the style of a Wheeler & Wilson sewing machine. The disks are turned by a ratchet, and will number from 1 to 999,999. For consecutive numbering, a little hook is attached to the ratchet, and the machine shifts itself. Otherwise, the disks are turned by the number.

THE TRIMMING AND CUTTING

was formerly done by hand, and of course very imperfectly and laborously. There were two things to be overcome in cutting by machinery—the inequality of the registry and the shrinkage. It was desirable that the edges should be trimmed, so they would wear well. If cut with a straight knife they would be beveled one way. As they are now cut, with circular knives, they have an edge beveled both ways.

The greenbacks are printed four on a sheet. One machine trims the margins, and another separates them. This latter is an ingenious contrivance. It slits them very fast, and lays them regularly in a box, each series of numbers separately. The notes are lettered A, B, C and D, and the numbers on each are the same: therefore it is essential they should be kept carefully apart. Each of the boxes that receives them has a movable bottom.

When the cutting for the day first commences, this bottom is near the top of the box, but as the cutting progresses and the number of the bills increases, a ratchet lets the bottom drop the thickness of a bill, so the box is kept just so full all the time, to make the bills slide in without doubling. It is intended that the cutting should be a criterion by which to judge of the genuineness of the bills, for every one must be the same width and length. If the end of a bill be placed on the center of another, there will be found no difference in the width—an exactness which cannot be given by the hand.

The currency-cutting machine is more complicated, as it cuts both ways, and files them in bundles of five dollars each, and I am not sure but it binds and seals them.

WET PRINTING

is the process now used in this establishment. The wetting is done by cloths instead of by dipping or sprinkling, as in newspaper printing. A room is prepared especially for this, with iron weights for pressing. Each man has his particular place assigned him, and all work in harmony, and with precision and celerity. Ordinary bills are wet and dried three times during the printing; but this process will soon be done away with, for preparations are being made to substitute.

DRY-PRINTING

in its stead, in which there will be at least two advantages—speed and better work. To do this some eighty heavy hydraulic printing presses are being set up, when what is called dry-printing, or printing on dry paper, will for the first time be successfully performed. There is a very perceptible difference between the present way and the one to be substituted. Specimen sheets show a clearer impression and a remarkable distinctness with which the faintest water-line is made to stand boldly out. This process, which is entirely new, has only been introduced after the most vehement and virulent opposition.

All sorts of stories were circulated of the building being crushed down, of there being an impossibility to take with a machine more than seventy-five impressions per day, and a hundred others of a similar character; but inviting men of judgment and skill in machinery to test the feasibility of the plan, Mr. Chase went on and instructed Mr. Clark to continue the experiments and perfect the system. The first tests were made with hand-pumps. Machine-pumps are now being rigged, and the whole will soon be in motion. There has been added to the pressure of the pumps a regulator in the shape of a weight, which is intended to take up their lost power as their force is exhausted, thus keeping up nearly the same pressure all the time.

THE CHECKS AND SAFEGUARDS

upon every one employed in this department, from the chief down to the lowest laborer, operate at every turn. Not even a blank sheet, much less a printed paper, is passed from one hand to another without being counted and receipted for, and unless there is collusion from one to another through every process through which the paper has to pass before it is money, through the entire range, there cannot be an over-issue. The paper is issued from one room, and is re-issued from that room sixteen or eighteen times before it is put into circulation; being counted, charged, and re-receipted for each time, and re-counted, re-charged, and receipted for through each process that it passes after leaving this room.

Five hundred persons are employed in note, bond and currency-making. It would seem as if this number ought, in a month's time, to turn out money enough to carry on half a dozen such wars as we have on hand. But a million of dollars in notes of the required denominations to do the current business of individuals, is an immense pile of paper, and when it comes to hundreds of millions, they grow into small haystacks as to size. By the present process of printing each pressman takes about five hundred impressions per day, By the hydraulic presses, it is expected that from three to five hundred impressions per hour will be taken.

RULES FOR FIRING CANNON.

We find a few things that may interest some of our readers in the volume of "Ordnance Instructions," adopted and issued for the guidance of officers in the United States Navy:—

RIFLE GUNS.

It is essential—

1st. That the base of every rifle projectile, especially the Parrott, shall be thickly greased before entering the gun. For this purpose common pork slush, prepared by several washings in hot water, may be used.

2d. That the bores of all guns shall be frequently washed, the grooves of rifled guns cleaned of all residuum and dirt, and a moist sponge invariably used. After firing the bore should be oiled with a sponge.

The attention of commanding officers is especially called to this requirement; and the bureau desires that the action of Parrott's and other rifle projectiles fired under the above conditions, may be carefully observed and reported; for it is believed that nearly all the failures in actual service result from the grooves being filled after a few rounds with a hardened residuum of powder.

It is also necessary that the shell shall be close "home" on the powder, otherwise the necessary expansion will not take place, and the shell will tumble immediately after leaving the gun, utterly destroying its range and accuracy.

If, however, a considerable interval should be left between the charge and the projectile, the strain upon the gun would be greatly increased and it possibly burst. For these reasons the rammer handle should be marked to verify this important fact in case of any accident to the gun.

It is very important that dirt, sand, or other

foreign substances should not be carried into the gun on the sponge or the projectile, or by the wind in batteries on shore.

In using guns on shore a canvas muzzle bag or a soft wad, or tight stopper of wood, suggest themselves as a means of security during the interval between loading and firing the gun. The cover or stopper might be removed, or left to be blown away at each discharge.

The longer the interval above alluded to, and the higher the elevation at which the gun is kept, the more important will be the precaution here recommended.

Much care is taken to give the projectiles uniformity of size, and if the powder is of suitable quality, those now supplied will almost invariably take the grooves. Should difficulty in this respect, however, be experienced from any cause, it may be remedied by separating the brass ring from the iron at three or four points of circumference. This should be done with a cold chisel, very slightly, and not so as to interfere with the loading. It is only necessary to sever the contact of the two metals.

It should be observed that the projectile slides in the gun with very little friction, particularly when greased. The gun should therefore be elevated and eased out when firing to leeward, that the shot may not be started from its seat. An experiment to test this, showed that running a 100-pounder out with the force of its crew against the forward heurter, the gun being level, started the shot forward nearly two feet. If the gun were fired with the shot in this position it would probably burst.

The 100-pounder and 150-pounder guns being, respectively, of the calibers of the 32-pounder and 64-pounder, spherical shot, and fired with the same charges, these shot may be fired from them with excellent effect, particularly on ricochet. The round shot should be sewed up in canvas, strapped to a sabot, or snaked between two gromet wads.

Both percussion and time fuses are supplied for these guns. When the object to be fired at presents a sufficient resistance, such as masses of timber or earth, ships, or solidly built houses, the percussion fuses alone should be used from rifled cannon. They will, however, frequently fail to explode the shell at long ranges, owing to the shell nor striking on its apex; or, if fired into loose earth, which checks its momentum too slowly to allow the plunger to strike with sufficient force.

It has been observed that "time" fuses burn with greater rapidity in shell thrown from rifled cannon. Being in front they are subjected to greater pressure from the air. A similar effect is produced when the fuse is confined under a water-cap, as in the naval time fuse. Hitherto no reliable time fuse has been arranged for rifled cannon.

DRIFT.

This is a deviation caused by the direction of the rifling, and is always *to the right* when influenced by the wind, and is always to be allowed for.

The *drift* is in practice confounded with the *deviation* produced by the direction and force of the wind, which may either annul or double it, according to whether it blows from right or left across the line of fire. At long range it is also necessary to consider the motion of the vessel across the line of fire. Suppose the vessel was moving at the rate of six knots, and the gun elevated to 50°, the time of flight would be by the tables, 18s., and the deviation arising from this cause would be upwards of 60 yards. It is therefore of great importance that the captain of the gun shall be carefully instructed in making this adjustment of the eye-piece.

The Sugar Beet in Illinois.

The *Prairie Farmer*, published at Chicago, Ill., gives the following account of the introduction of the sugar-beet into Illinois, and of the arrangements which are being made for the manufacture of the sugar:—

"There was a very general interest manifested throughout the North, in the experiments in the growing of sugar-beets and their manufacture into sugar, inaugurated in this State, last season, by the Gennert Brothers, at Chatsworth. We did what was in our power, to give the enterprise that position before the public that its importance demanded, and we know that very many men of capital watched its progress with eager interest, ready to embark in the business should it be clearly demonstrated to their minds that it was a success. As it is well known, the crop was successfully grown. The yield was all that was desired—the quality of the beets superior, and the cost of growing entirely satisfactory. On account of the scarcity of mechanical labor, it was impossible to secure and get ready for operation all the machinery necessary for manufacturing the large crop into sugar, though enough was done to satisfy those who examined into it most closely, of the feasibility of profitably growing the beet for sugar, upon our prairies. But the great public that, very justly, demands the strong proof of complete success, demonstrated by actual figures, of so many acres grown, at so much cost, and producing so much sugar, was not fully convinced, and hence the beet-sugar question is still an open one.

"But interest in the matter has not subsided, and further progress is closely watched. Messrs. Gennert's premises are frequently visited by gentlemen from various parts of the East, and there is much inquiry from all quarters concerning the prospects the present year. In order to keep our readers as fully posted as possible upon this subject, we recently addressed Mr. T. Gennert, the manager at Chatsworth, concerning it, to which he replies, that his present crop planted upon land where beets were grown last year, is in first rate condition, even better than last season at this date, and the beets far sweeter than at a similar stage of growth in Germany. Whether this is owing to the difference in the season, or to a somewhat different and better cultivation, he is not prepared to say. Everything so far, fully meets the promise given last year, of the perfect adaptability of prairie soil to the sugar-beet crop.

"With regard to machinery, Mr. G. informs us that with the exception of a single piece, everything is upon the spot, and most of it already in its appropriate place. The remainng piece is being made at St. Louis, and is nearly completed. He assures us that everything will be in complete running order by the time the beets are ready to work up, and that he has experienced help engaged to attend to each process in the manufacture. He intends to commence manufacturing early this season—certainly by the last of September—and thinks he shall be able to work up his entire crop of twenty-five acres, in about four weeks.

"Mr. Gennert also planted out last spring a large quantity of his beets grown in 1863 for producing seed. They did well and give every promise of a large yield. His idea is to experiment with this so as to compare the beets produced with those from imported seed, a quantity of which he expects to arrive as early as October or November. In order to test the value of home-grown seed, he will furnish to parties, binding themselves to faithfully report to him the result, a half pound package of each—his home-grown seed and the imported—at the mere cost of growing and of importation.

"For ourselves we can but repeat our former expressed conviction of the paramount importance of this enterprise considered with reference to its future bearing upon the agricultural and commercial greatness of the West, if successful, and our own unshaken faith in its final and speedy success."

BONES.

On the 31st of March a lecture was delivered on bones before the Society of Arts, in England, by Dr. F. Grace Calvert, F.R.S., F.C.S., from which we take some valuable extracts:—

BONES OF YOUNG AND OLD.

The composition of "green bones," or bones in their natural state, may be considered under two general heads, viz: the animal matters, consisting of a substance called osseine and a few blood-vessels, and the mineral matters, chiefly represented by phosphates of lime and a few other mineral salts. The composition of bones has been examined by many eminent chemists, but the most complete researches are those published in 1855 by Mr. Fremy, who examined bones, not only from various classes of vertebrated animals, but also from different parts of the same animal.

The first conclusion drawn by Mr. Fremy from these researches, is that he found a larger proportion of mineral matter than is generally admitted by chemists. Secondly, that there is no material difference in the composition of various bones taken from different parts of the man, or of any one animal, but that age has a very marked influence on composition. Thus, in the bones of infants, there is more animal and less mineral matter than in the adult, whilst in old age there is more mineral and less animal matter than in the middle-aged man. The mineral substance which chiefly increases in old age is carbonate of lime. Lastly, he could find no marked difference between the bones of man, the ox, calf, elephant, and whale; while in the bones of carniverous animals and of birds there is a slight increase in the amount of mineral matter. Allow me now to call your attention to a most interesting query. I hold in one hand the mineral matter only of a bone, which you can see retains perfectly its original form, and in the other hand I have the animal matter only of a similar bone, which also retains the form in which it previously existed, but is flexible instead of rigid. The question, therefore, arises, whether the strength and hardness of bones proceed from these two kinds of matter being combined together, or are their respective molecules merely juxtaposed? The answer is, the latter; for, as you see by this specimen, the mineral matter has been entirely removed without deforming the animal texture. Further, in the fœtus it is found that the bones contain nearly the same proportions of animal and mineral matters as those of the adult. Also, it has been observed by Mr. Flourence and other eminent physiologists, that the wear and tear of bones during life is repaired by the formation of a new bone on the exterior surface of the bone, while the old substance is removed through the interior duct, and that the composition of the new layer is the same as that of the original bone.

WHERE THE PHOSPHORUS IN BONES COMES FROM.

The animal matters are chiefly represented by phosphate and carbonate of lime. Berzelius was the first to establish the fact that phosphate of lime was the only substance possessing the properties necessary for the formation of bone, owing to the extremely simple chemical reactions which cause the soluble phosphates to become insoluble. Let us trace shortly the sources from whence we derive the large proportion of phosphate of lime which exists in our frames. Several of our most eminent chemists have proved the existence of phosphorus in sedimentary and igneous rocks, and the important part played by phosphorus in nature cannot be better conveyed to your minds than by this extract from Dr. Hofman's learned and valuable 'Report on the Chemical Products in the Exhibition of 1862':—"Large masses of phosphorus are, in the course of geological revolutions, extending over vast periods of time, restored from the organic realms of nature to the mineral kingdom by the slow process of fossilization; whereby vegetable tissues are gradually transformed into peat, lignite, and coal; and animal tissues are petrified into coprolites, which, in course of time, yield crystalline apatite. After lying locked up and motionless in these forms for indefinite periods, phosphorus, by further geological movements, becomes again exposed to the action of its natural solvents, water and carbonic acid, and is thus restored to active service in the organisms of plants and lower animals, through which it passes, to complete the mighty cycle of its movements into the blood and tissues of the human frame. While circulating thus, age after age, through the three kingdoms of nature, phosphorus is never for a moment free. It is throughout retained in combination with oxygen, and with the earthy or alkaline metals, for which its attraction is intense."

THE WAY TO MAKE SUPERPHOSPHATE OF LIME.

Bones are generally used for manuring in one of these three forms:—1st, As ground green bones; 2d, As ground boiled bones (that is, bones nearly deprived of their osseine by boiling under pressure); 3d, Superphosphate of lime.

Green or raw bones have been used on grass land for a long period, but their action is exceedingly slow and progressive, owing to the resistance of the organic matter to decomposition, and the consequently slow solubility of the phosphate of lime in carbonic acid dissolved in water. What substantiates this view is that boiled bones are far more active than the above. It is found that from 30 to 35 cwt. per acre of these will increase the crops on pasture land from 10 to 20 per cent in the second year of their

application. But the great advantage which agriculture has derived from the application of bones as a manure, has arisen from their transformation into superphosphate of lime, especially applicable to root and cereal crops. To Baron Liebig is due the honor of having first called the attention of farmers (in 1840) to the importance of transforming the insoluble phosphate of lime of bones into the soluble superphosphate, rendering it susceptible of immediate absorption by the roots of plants, and of becoming at once available for their growth. These suggestions of Liebig were rapidly carried out on a practical scale by Messrs. Muspratt, of Lancashire, and J. B. Lawes, of Middlesex; in consequence of the valuable results obtained by them, the manufacture of artificial manures has gradually grown into an important branch of manufacture in this country. The manufacture of superphosphate of lime is so simple that any farmer possessing a knowledge of the mere rudiments of chemistry can make it for himself, by which he will not only effect great economy, but also secure genuineness of product. All he requires is a wooden vessel lined with lead, into which can be placed 1,000 lbs. of ground boiled bones, 1,000 lbs. of water, and 500 lbs. of sulphuric acid, sp. gr. 1·845 (or concentrated vitriol), mixing the whole, and stirring well, for about twelve hours. After two or three days a dry mass remains, which only requires to be taken out and placed on the land by means of the drill, or to be mixed with water and sprinkled on the land. When very large quantities of this manure are required, the plan devised by Mr. Lawes appears to me to be the best. It consists in introducing into the upper end of a slightly inclined revolving cylinder a quantity of finely-ground boiled bones, together with a known proportion of sulphuric acid of sp. gr. 1·68. As the materials slowly descend by the revolution of the cylinder they become thoroughly mixed, and leave it in the form of a thick pasty mass, which is conducted into a large cistern capable of containing 100 tuns, or a day's work. This is allowed to remain for twelve hours, when it is removed, and is ready for use. Most manufacturers find it necessary to add to the phosphate of lime of bones other sources of phosphates, such as coprolites, or the fossil dung of antediluvian animals which have been found in large quantities in Suffolk, Cambridgeshire, and elsewhere, and contains from 36 to 62 per cent of phosphate of lime, and from 7 to 38 per cent of organic matter. Others employ a mineral substance called apatite, containing about 32 per cent of phosphate of lime, and found also in large quantities in Spain, Norway, France, etc. Others, again, employ guanos rich in phosphate of lime, such as those of Kooria Mooria Islands and Sombrero phosphates. The following is the average composition of the superphosphate of lime of commerce:—

Soluble Phosphate	22	to 25	per cent.
Insoluble "	8	" 10	"
Water	10	" 12	"
Sulphate of Lime	35	" 45	"
Organic Matter	12	" 15	"

Nitrogen 0·75 to 1·5 per cent.

The valuable and extensive researches of Messrs. Lawes and Gilbert, and Messrs. Boussingault and Ville, have not only demonstrated the importance of phosphates to the growth of cereal and root crops, but also that phosphates determine in a great measure during vegetation the absorption of nitrogen from the nitrates or from ammonia.

[To be continued.]

The Old Mines of Mexico.

From the records of the past we may often discern or speculate with some certainty on the course of the future; and now that recent events have turned the attention of Europe to Mexico, we believe that we shall be doing good service when we recall a few facts as to the old mines of that interesting quarter of the world. One fact cannot be denied, that if metallurgy has made immense strides in consequence of the metalliferous discoveries which have characterized the nineteenth century, Mexico has not waited for the development of science in order to give to the world a large share of the wealth with which she has been endowed by Providence. On the contrary, with extremely restricted means, this country has drawn from its mines unheard of results. The mineral wealth of California has enjoyed this advantage; incontestible as it was prodigious, it has fallen into the hands of a people the best adapted to bring it out in strong relief. It is not enough for a merchant to have fine merchandize, as upon his power of making it please the eyes a good deal of his reputation depends; and it is probable that in the hands of another nation, California would have been far from promising only that which she has already yielded; at the same time, it may, perhaps, be said that, notwithstanding the marvelous results attained, no Californian mine has at present acquired the justly merited celebrity of some of the old veins of Mexico. Many facts might be cited in support of this assertion, but we will content ourselves with the following, merely remarking that the totals advanced may be considered as authentic, being based upon the amount of dues levied by the Spanish Crown previously to 1822, those dues representing one-fifth of the total production.

The mines of El Lacal and La Biscaina, in the province of Mexico, worked by one Cedro Tereros (created subsequently Count de Regla, in consideration of the magnificent presents which he made to the Spanish Crown), produced in 1762, £868,320. From this period to 1774 the production left a nett profit of £1,200,000, after having paid £240,000 for expenses of working and the establishment of two haciendas at San Antonio and Regla. From 1794 to 1801 the nett profit was still £1,200,000. The Veta Madre at Guanajuato, comprising some direct ramifications. produced from 1766 to 1825, judged by the fifth paid to the Crown, and the accounts kept, £45,-187,157. The Valenciana Mine to the north of the town of Guanajuato, was first worked by some poor people, but at a depth of 80 yards they met with a vein which produced from 1788 to 1810 an annual average of £276,639, which left to the workers a clear nett profit of £105,540. If it be desired to form an idea of the fabulous sums expended in working these mines, the case of the Valenciana Mine may be cited by way of illustration. Thus the different pits sunk in the working of this mine cost the following sums: —El Tiro Viejo de San Antonio, £79,200; Burgos and San Ramon, £16,400; the hexagonal pit of Nuestra Senora de Guadaloupe, £140,000; and, finally, El Tiro General commenced in 1801, and stopped at the period of the revolution—or rather the revolt from the yoke of the parent state—when it had attained a depth of 635 varas, or 1,693 ft., £200,000. The Santa Anita Mine, situated on the Veta Madre de Guanajuato, on which a pit known as the San Miguel was sunk at an expense of £140,000, gave a first profit of £2,200,000. The vein of Catorce, in the province of San Luis Potosi, was in full working from 1781 to 1783, and Father Florès, of the Company of Jesus, received for his share during those two years the sum of £700,000. The Catorce mineral, it may be added, sold on the opening of the mine at 4s. 2d. per lb. The Pavellon Mine in the Zacatecas, paid to the Crown, as the fifth of its total production during ten years, £2,400,000, which would carry its annual production £1,200,000. Don José Mariano Fagoago, who directed at a later period the works of this mine, and carried out some very extensive operations, derived from them in eight months, according to the registers of the Royal Treasury, the immense sum of £2,300,000. But such was the imperfection of the means of reduction, &c., which then existed, that Don José was not less than nine years in reducing the mineral which he had extracted in eight months. The Abra Mine, in the neighborhood of Guarisamez, in the Zacatecas, under the direction of Senor Zambrano, yielded in 25 years, to the king of Spain for his fifth, £2,200,000. Let us further mention the mine of Nuestra Senora de Guadaloupe, in the district of Cosala (State of Sinaloa), worked in 1825 under the direction of Don Francisco Iriarte, who refused to let it to an English company for £200,000, and who did much better with it; at any rate, according to his own account. The mine of Agua Caliente, in the district of San Ignacio, prospered from 1810 to 1815, when it was worked by three families—the Picos, the Nicts, and the Urrias. The yield was so rich that there was scarcely a member of these families who had not the most ordinary utensils of his household of silver, while the broker charged with the sale of the silver produced realized £4,800 for his commission during two years.

If the Mexican mines yielded in old times such striking results, although worked with very imperfect processes, what may be hoped for from them when steam and other modern improvements are applied to their development? Nevertheless, there are persons who carry their skepticism so far as to call in question the wealth of the mines of Mexico. It must be folly or ignorance to do so, and with good government we doubt not that Mexico will again deliver very great quantities of the precious metals to the world. There is nothing which so checks the national progress as individual insecurity. We do not say that the rule which Spain exerted over her South American colonies was exactly what it should have been, on the contrary, we fear that it was arbitrary, selfish and unjust; at the same time it must have been better than the violent agitations and discords with which this important quarter of the world has, up to the accession of the new Emperor, been assailed, to the annihilation of credit and the prostration of industry.—*London Mining Journal.*

Uses of Ice.

In health no one ought to drink ice-water, for it has occasioned fatal inflammations of the stomach and bowels, and sometimes sudden death. The temptation to drink it is very great in summer; to use it at all with any safety the person should take but a single swallow at a time, take the glass from the lips for half a minute, and then another swallow, and so on. It will be found that in this way it becomes disagreeable after a few mouthfuls. On the other hand, ice itself may be taken as freely as possible, not only without injury, but with the most striking advantage in dangerous forms of disease. If broken in sizes of a pea or bean, and swallowed as freely as practicable, without much chewing or crushing between the teeth, it will often be efficient in checking various kinds of diarrhœa, and has cured violent cases of Asiatic cholera.

A kind of cushion of powdered ice kept to the entire scalp, has allayed violent inflammations of the brain, and arrested fearful convulsions induced by too much blood there. In croup, water, as cold as ice can make it, applied freely to the throat, neck, and chest, with a sponge or cloth, very often affords an almost miraculous relief, and if this be followed by drinking copiously of the same ice-cold element, the wetted parts wiped dry, and the child be wrapped up well in the bed-clothes, it falls into a delightful and life-giving slumber. All inflammations, internal or external, are promptly subdued by the application of ice or ice-water, because it is converted into steam and rapidly conveys away the extra heat, and also diminishes the quantity of blood in the vessels of the part.

A piece of ice laid on the wrist will often arrest violent bleeding of the nose. To drink any ice-cold liquid at meals retards digestion, chills the body, and has been known to induce the most dangerous internal congestions. Refrigerators, constructed to have the ice above, are as philosophical as they are healthful, for the ice does not come in contact with the water or other contents, yet keeps them all nearly ice cold. If ice is put in milk or on butter, and these are not used at the time, they lose their freshness and become sour and stale, for the essential nature of both is changed, when once frozen and then thawed.—*Hall's Journal of Health.*

Improved Cement.

Common lime mortar becomes hard from long exposure to the atmosphere, by absorbing carbonic acid slowly, and thus returning to its original condition—limestone being a carbonate of lime. A patent has been taken out by C. W. Westmacott, of London, for a new cement to be used as mortar for building and plastering and also casting in molds. The nature of the improvement consists of a mixture of carbonate of lime with common burned lime. The cement is composed of one bushel of burned lime to two bushels of ground dry chalk or ground limestone or marble. The lime, as it comes from the kiln, is first slacked with water, then mixed with the ground chalk or limestone in water; sand is then added in the same way that common mortar is made, and the mass allowed to stand for two or three days before the cement is used. This cement may also be made by mixing the burned lime, dry, with the chalk (which is dried in an oven) in powder, and kept for use, to be mixed with water. It may also be worked into a paste and molded like clay. It soon becomes quite hard and fixed.

Improved Steam Bell-ringer.

The object of this invention is to ring the bells on locomotives without requiring the services of the fireman for that purpose. The invention is, as may be seen in Figs. 1, 2 and 3, a case or cylinder, A, containing a wheel, B, which has pistons or floats upon the extremities of the arms. This wheel is connected to its shaft in such a way that by the rotation of the wheel motion is imparted to the crank on the bell to which the rod, C, connects. Steam is admitted to the wheel by the handle, D, which runs into the cab of the engine, where it is controlled by the engineer. In regard to its action and advantages the inventor says:—"I admit the steam at the under side of the machine, the shell being slightly convolute, so that the steam may strike and pass three of the floats in succession, until it reaches the fourth, the shell at that point becoming concentric. The floats work steam-tight from that point one-eighth—or more—of the diameter to where the shell enlarges for the expansion of the steam and the exhaust. To accomplish this the floats are attached to the periphery of the wheel, the rim of which works steam-tight between two flanges, E (see Fig. 3), attached to each side of the shell on the inside; completing about three-fourths of the diameter of the circle. The object to be obtained by leaving out the other portion of said ring is to give the steam room to expand into the center of the wheel, so as not to follow the floats in their revolution. When these pass the opening of the two rims they then work steam-tight in the shell a portion of the diameter of the circle to the point where the jet of steam was originally admitted. The advantage of this bell-ringer over the old way of ringing bells with a cord, are, that it will give a uniform stroke, and the strokes will come as fast as the engineer wishes, according to the amount of steam let on; it will ring all day if steam is kept up, whether the engine is running or standing still, and the fireman can be doing whatever is necessary about the engine, as it will not require his services. In coming into a town or city or through either, where there are many cross-streets, either the engineer or fireman can be on the look-out or watching the train. In coming into or going out of depots it is necessary to use much caution; this machine is equal to an extra man for that purpose, for with the old way it takes the engineer or fireman about half of the time to ring the bell." Several of these bell-ringers are now in use on Western roads, where they are said to give perfect satisfaction. This bell-ringer was patented through the Scientific American Patent Agency on April 19, 1864, by W. H. Beach, of Chicago, Ill.; for further information address the inventor at the Post-office drawer 5,785, Chicago, Ill.

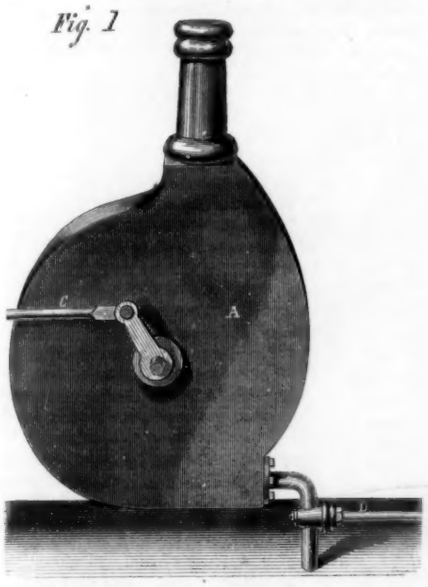


Fig. 1

Fig. 2

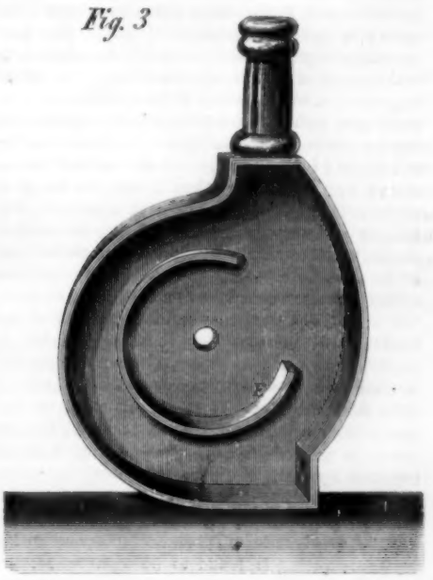


Fig. 3

BEACH'S STEAM BELL-RINGER.

A CURE for whooping cough is announced in France, of rather a singular character. It is inhaling for a few moments the vapor given off by the lime which has been used in the purification of coal gas.

Pearl Fishery in Ceylon.

The fishery usually takes place in the month of March, when the sea is calm and the current least perceptible.

The process is as follows:—The whole of the boats assembled are numbered and divided into two squadrons, the red and the blue, each consisting generally of sixty or seventy boats. The squadrons fish alternately. Each boat has its company, five diving-stones, and two divers to each stone. All the men are numbered as well as the boat, and in the Kottoo there are divisions with corresponding numbers, so that each boat knows the precise spot where its oysters are to be deposited.

The squadron starts usually between eleven and twelve P. M., so as to reach the fishing-ground by sunrise. The banks are about twelve miles from the shore. As soon as the boats have arrived, the signal is given, and the diving-stones go over the sides of the boats with a low rumbling noise. One diver goes down with each. The other holds the signal-rope, watches the motions of his comrade, draws up first the stone, then the net in which the oysters are lodged as torn from the bank, and then the diver himself. Each pair of divers keep their oysters separate from the rest in large nets or baskets, so that luck and labor determine the remuneration of the pair.

When one man is tired, the other takes his place; but they do not dive alternately, as too much time would be lost by changing. The man who has been down, after remaining a minute or so upon the surface, during which he either floats without apparent exertion or holds on by a rope, descends again, and repeats the process, until he requires rest, when he takes his turn on board. This continues without interruption for six hours. Indeed, the stimulus of self-interest brought to bear upon all is so great, that as the time approaches for striking work, the efforts of the men increase, and there is never so much activity as when the heat is most intense, the sky without a cloud, the sun glaring frightfully, and the sea like molten lead. At last the second gun is fired, every stone goes down simultaneously for one more haul, and then every hand is employed in making sail, and every boat has her head to the shore.

The Adigar (a native head-man stationed at Manaar, who is allowed a boat with five stones as his share of the fishery) acts as commodore.

As the boats reach the beach they let go their anchors opposite the Government "Kottoo," the first arrival getting the best place.

Each boat swings upon her anchor, with her stern to the shore, and in an instant the divers are in the water, and each pair carries the results of their day's work to the Kottoo. Then they divide the oysters into four heaps. In two hours the whole of the seventy-five boats are unloaded, unless delayed by contrary winds. The divers' share removed, and the three-fourths belonging to Government left in the Kottoo, divided into heaps of 1,000 each, the doors are locked, guards stationed, and everything is in readiness for the Cutcherry sale.

This system appears peculiarly well suited to the country and to the objects in view, by bringing to bear upon the daily results of the fishery the largest amount of private interest and the smallest amount of Government control. No man could be forced into doing what the divers do voluntarily. No fixed payment would induce them to dive as often in the day, or to unload their boats with equal dispatch.

The revenue derived from the pearl fishery is of a very uncertain and precarious nature. The Dutch had no fishery for twenty-seven years—from 1768 to 1796, and they were equally unsuccessful from 1732 till 1746. From 1833 to 1854 there was no fishery at all. But the scientific inquiries recently made led to the conclusion that the pearl-oyster may possibly be brought within the domain of pisciculture.

The pearl fishery of 1859 was, as regards results, the most successful that has taken place since the fisheries were resumed in 1855. It realized £48,215. This great increase in the selling power of the oysters was owing to the profit, which could not have been less than 300 per cent, made by the speculators in 1858. The fame of this brought all India into the field as competitors. Money was as plentiful as buyers; and the same oysters which averaged £1 19s. a thousand in 1858, in 1859 produced an average of £4 10s., the highest rate paid being no less than £8 8s. There is no reason to doubt that even at these high prices large profits were made.

Captain Pritchard describes the fishery of 1860 in the following terms:—

"The most prominent feature connected with this fishery has been the unprecedentedly high prices given or the oysters; those of the North Modregan having sold at rates varying from 155 to 115½ rupes per 1,000 (for £8,726 18s.), and the oysters of the south-east Modregan at 180 to 92 rupes (or £27,954 14s). Circumstances generally favored this result. But the principal causes were, that the oysters themselves had yielded a most valuable out-turn, and that there exists now a very great demand for pearls in the various markets of India and China. The following statement shows the result of this pearl fishery from 1855 to 1863:—

Years	No. of Oysters fished for Government.	Average Price per 1,000. £	s.	d.	Total Produce. £	s.
1855	5,012,108	2	4	0	10,922	0
1856	Nil.	—			—	
1857	24,380,308	0	16	8½	20,550	15
1858	12,353,049	1	19	0	24,120	
1859	6,391,549	4	10	0	48,215	19
1860	2,733,954	13	4	0	36,681	12

There was no fishery in 1861 and 1862. The annual expenditure incurred by the Government for the fishery is about £4,000.—*The Technologist.*

IT is confidently stated that the out-turn of coffee in 1864—65 will be the largest ever shipped from Ceylon.

Economy of Lenoir's Gas Engines.

Mr. John Pinchbeck writes as follows to the London *Engineer:*—

"Notwithstanding the unfavorable opinion expressed by your correspondent, Mr. Birckel, on the merits of the Lenoir gas engine, I am not without the hope (if you will allow me space in your columns) of removing, or, at least, of modifying, that opinion, and of proving that, after all, the gas engine may possess some merits, and that it is not so 'monstrous a production' as he at first imagined.

"If your correspondent will turn to the catalogues of the most eminent makers of portable steam engines he will see that the quantity of fuel required for working these engines is much greater than the 6 lbs. he has taken for his data. Take, for instance, an 8 horse-power engine; the quantity of coal is set down at 7 cwt. for 10 hours, exclusive of what is required to raise steam—about ½ cwt. The time necessary to get up steam is about 45 minutes, so that the engine requires 7½ cwt. for 9¼ actual working hours, or at the rate of 90 lbs. per hour. Compared with such an one a 1-horse power engine would labor under every disadvantage as regards economy of fuel, and I do not hesitate to say that the fuel required will not be less than 1 cwt. per day of 10 hours at the very lowest computation, instead of 60 lbs., as given by your correspondent. So small an engine would require constant attention on the part of the attendant; the slightest neglect, or an absence of ten minutes, would be enough seriously to lower the pressure of steam. No inconvenience of this kind is felt with the gas engine, as no attendant is required. The gas-tap is opened, the engine started, and continues to work till the gas is turned off. A little oiling once a day is all that is required; any comparison neglecting this point is unfair, because the major part of the expense of working a steam engine is ignored.

"In Paris, where upwards of 200 of the gas engines are at present at work, the average cost of the chemicals (sulphuric and nitric acids) if purchased at wholesale prices, is found to be 2½d. or 3d. per horse-power per day, which is not so serious an outlay as Mr. Birckel imagines. Taking his data, viz: 50 cubic feet of gas, at 4s. 3d. per 1,000, the cost of 1 horse-power per day of 10 working hours will be as follows:—

	s.	d.
500 cubic feet of gas	2	1½
Sulphuric and nitric acids, say	0	3
Total cost of 1-horse power for 10 hours.	2	4½

The cost of working the 1 horse portable steam engine will be—

	s.	d.
1 cwt. of coal at 1s.	1	0
1 day's wages to attendant, at 18s. per week (wages in large towns)	3	0
Cost of working a portable steam engine for 10 hours	4	0

"From the above it will be seen that, although the gas used may be four times the expense of coal, yet the cost of the same power by the gas engine is little more than half that of a steam engine.

"If the expense of working a gas engine be compared with horse-power, the advantage will be equally in its favor:—

	s.	d.
Take keep of 2 horses, each working 5 hours per day, at 10s. per week	3	4
Boy to drive, at 12s.	2	0
Cost of horse labor per day of 10 hours.	5	4

"I think, therefore, it may be fairly admitted that the gas engine does possess the advantage of economy in working; and that where power of one or two horses is required, it may be employed to advantage and that it is not so monstrous a thing after all.

"Reading Ironworks, July 11, 1864."

Petroleum transported through Pipes.

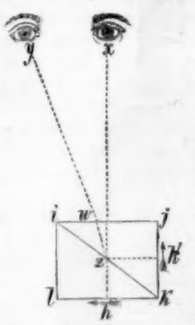
The *American Railroad Journal* says:—"For the more convenient transportation of the oil from the wells to the railroad, the Oil Creek Railroad Company and the Atlantic and Great Western Railroad Companies are laying between the termini of their roads iron pipes, through which the petroleum will be forced from the tanks at the wells to the railroad termini by powerful steam pumps. It is estimated that by this means, if necessary, 10,000 barrels a day can be delivered to the roads at a cost greatly less than by the present means, thus reducing the cost of the petroleum to the consumer, and preventing the fluctuations in the amount transported from the effect of the seasons on the wagon roads."

PHOTOGRAPHIC ITEMS.

A correspondent asks the address of the introducer of the wonderful "Crystal Miniature," of which we have before published some accounts. We believe Mr. Jos. W. Swan, of Newcastle, England, enjoys the credit of bringing this beautiful application of photography before the public in practical form.

For the information of photographers generally we subjoin a description of the crystal picture with a diagram, which will enable any person of skill to produce them. We copy from our valued contemporary, the *British Journal of Photography.*

"A piece of solid clear glass is ground into the form of a prism, having one of its angles a right angle, and the two other angles of about 43° and 47° respectively. This is cut in halves transversely, and the larger sides of the two pieces are placed in contact, so that viewing them endwise they appear as in *i, j, k, l.* It is evident that if an eye be placed at *x* an object at *h* will be visible, because the surfaces *i j* and *l k* are parallel, as also the two surfaces at *i k*; but, if the surfaces at *i k* were inclined at an angle of 45° to *i j*, an object at *h'* would also be seen by an eye at *x* by reflection from the surface *i k*, its incidence thereon exceeding the critical angle; and it must not be forgotten that, although the two surfaces at *i k* are popularly supposed to be *in contact*, this is not actually true, there being a film of air, however thin, between them. The surface, *i k* is, however, inclined to the perpendicular, *h z*, about 42°, so that, instead of the reflection being from *z* to *x*, it is really from *z* to *w*, where it is slightly refracted outwards in the direction of the dotted line to *y*; consequently if an eye be located at *y* it will see an object at *h'*. It is, therefore, only necessary to adjust in proper positions a pair of stereographs at *h* and *h'* in order that each one shall be seen by its appropriate eye, and stereosity of effect will be produced. It is observable that, as the object at *h'* is viewed by reflection, it must be inverted before applying it to the surface of the prism, and as Mr. Swan applies the films by tranference to the prism, and as transparent positives are needed they can readily be printed of a convenient size in the camera. It is probable that the paper prepared for the practice of photodiaphanie, lately introduced by Messrs. Harvey, Reynolds and Fowler, of Leeds, may be found useful for this purpose.



"Mr. Swan mounts the prism elegantly in a kind of jewel case with opal glass at the bottom, so that when looked at, by being in the hand and the bottom turned towards the light, each eye can see only the image intended for it, the limits of the prism acting as diaphragms which obscure the image not intended for each eye respectively, and a portrait appears as a perfect miniature bust of surpassing delicacy and brilliancy inclosed in a mass of crystal. The crystal miniature is one of those productions that charms alike the unlearned by its beauty and the man of science by its cleverness of adaptation."

Re-union of Dissevered Nerves.

Professor Laugier, one of the surgeons of the Hotel Dieu, has recently made a most important communication to the Academy of Sciences. In an operation performed on the arm, and in which the median nerve had been severed, that skillful surgeon united by a suture the two ends of the nerve. Almost immediately after signs of sensibility were observed, and in a few days more the nerve had entirely recovered all its properties of sensation and motion. I need not insist on the importance of this case, which throws such a new light on physiological pathology of the nervous system. No longer than two weeks ago, in a discussion which took place at the Society of Surgery, it was affirmed by several members that the regeneration of the nervous tubes, which alone could cause the recovery of sensibility and motility, was the work of weeks and months, and could not immediately take place. Such also was the opinion of M. Brown-Sequard and of MM. Vulpian and Philippeaux. These two gentlemen published last year a memoir which received academical honors, and in which they gave the relation of different experiments they had made, the result of which is entirely opposed to that recently obtained by M. Laugier. The memoir of that eminent professor, read at the Acacemy of Sciences, has been the scientific event of the week.—*Paris Correspondent of the London Lancet.*

A Colorless Varnish.

There are few things in photography that give the professional and amateur followers of the art more trouble than varnish; and as lac—a resinous substance, the product of an insect found on several different trees in the East Indies—is one of the principal ingredients used, it has been a great desideratum among artists, to render shellac colorless, as, with the exception of its dark brown hue, it possesses all the properties essential to a good spirit varnish in a higher degree than any other known resin. A premium of a gold medal, or thirty guineas, was offered some years ago by the Society of Arts for "a varnish made from shell or seed lac, equally hard and fit for use in the arts." There were two candidates, Field and Luning. When on due examination and trial both processes were found to answer the purpose, the Society awarded the sum of twenty guineas to each of the candidates. We give the process known as—

LUNING'S COLORLESS VARNISH.—Dissolve two ounces and a-half of shellac in a pint of rectified spirits of wine, boil for a few minutes with five ounces of well-burnt and recently-heated animal charcoal. A small portion of the solution should then be filtered, and if not colorless, more charcoal must be added. When all color is removed, press the liquor through a piece of silk, and afterwards filter through fine blotting-paper. This kind of varnish should be used in a room at least 60° Fah., perfectly free from dust. It dries in a few minutes, and is not liable afterwards to chill or bloom. It is particularly applicable to drawings and prints that have been sized, and may be advantageously used upon oil paintings which are thoroughly hard and dry, as it brings out the colors with the purest effect. This quality prevents it from obscuring gilding, and renders it a valuable varnish for all kinds of leather, as it does not yield to the warmth of the hand and resists damp, which subjects leather to mildew. Its useful applications are very numerous, indeed to all the purposes of the best hard-spirit varnish.

A common lac varnish may be made by digesting four ounces of clear-grained lac in a pint of spirits of wine in a wide-mouthed bottle, keeping it in a warm place for two or three days, and occasionally shaking it. When dissolved, strain through flannel into another bottle for use.—*British Journal.*

ARTIFICIAL LARYNX.—Dr. W. N. Cote in the Paris *Medical Gazette* says:—"M. Edmond Fournier, at a late sitting of the Academy of Sciences, produced an artificial larynx composed of india-rubber pipe and several keys and pedals, by means of which the action of the natural muscles is imitated and sounds similar to those of the human voice are produced. This apparatus is constructed according to the inventor's theory of the production of sound, founded on a long and patient investigation of the construction and action of the larynx."

A PEAT company is to be formed in Rochester, N. Y., to supply that city with fuel. It seems that the peat can be cut, dried, and conveyed to the city at a much less cost than coal. Long Island and New Jersey, it is said, are likely to produce large quantities, and the method of drying the peat and preparing for market has been patented.

FAST TIME.—The steamer *Daniel Drew*, Capt. Tillman commanding, on her down trip for New York, made the extraordinary fast time from West Point to New York—fifty-three miles—inside of two hours.—*Newburgh Telegraph.*

How the Mine before Petersburg was Constructed.

A correspondent of the Philadelphia *Press* gives the following interesting account of the manner in which the mine was run under the rebel fort at Petersburg:—

"The work was assigned to the 48th Pennsylvania, a regiment which is composed chiefly of miners from the coal mines of this State. Their experience in mines admirably fitted them for the task, which they carried to such a successful conclusion. The method they pursued under the direction of their colonel, himself a practiced miner, was strictly scientific. The process of triangulation was employed. Lines were laid off behind our works. From these lines as bases, and with the angles formed by lines extending to our exterior works, sprang a simple problem of geometry easily solved. Five triangulations were made, and an excavation commenced in the side of a hill upon which our exterior lines of works run. The tunnel or 'gallery' was about four and a half feet high, the same width at the bottom, and two feet at the top. The tools used were abbreviated army picks. Water was met with not far from the entrance, and for a time gave no little trouble. The floor, however, was planked, and the sides and ceiling shored up. A quicksand was met with and to obviate it the tunnel was curved upwards, so that the latter half was several feet higher than the entrance. The oozing of the water formed mud in several places, so that the regiment came from their daily labor bespattered and stained. The earth as fast as excavated, was conveyed in hand-barrows, made of cracker boxes or half barrels, to the mouth, where it was emptied into bags which were afterwards used on the top of the breastworks. In this manner no betraying accumulation of earth took place.

"The ventilation of the gallery was effected by a shaft sunk at the side of the tunnel just within our interior lines of works. Here a fire-place was built with a grating opening into the gallery. Tubes made of pine boards were inserted through the earth into the fire-place, through which the air when it became rarified and ascended, created a suction or draft in the tubes connecting with the gallery. As fast as the work advanced additional tubes were jointed on. The smoke of the fire, of course, could not be concealed, but suspicion was quieted by keeping other fires burning along the lines. The lighting of the tunnel was effected simply by placing candles in lanterns along the walls at a distance of about twenty feet apart.

"At length the end was reached, and the triangulation was abundantly verified in the noises overhead. The nailing of timbers and planks could be distinctly heard and left no doubt that the men were directly beneath the rebel fort. The enemy were evidently making a flooring for their artillery. As near as could be ascertained, the distance from the tunnel to the fort was twenty feet.

"After it was sufficiently evident that a point directly under the fort was reached, the construction of the mine was commenced. The angle of the fort projects towards our lines, and under this angle the tunnel diverged into two galleries, each running as near as could be ascertained, under each side. It was the intention to make the mine consist of eight magazines, placed at intervals along these branch galleries, so that the entire length of the fort might be blown up, in place of one spot. Preliminary experiments were made by the Colonel (Pleasants) with cartridges of powder, which he inserted in the earth and ignited by a fuse. He ascertained that the work of making a breach would be more effectually secured by distributing the powder instead of putting it in a bulk. In the latter case the explosion resulted in a deep and broad crater; in the former in a wide chasm. Where the cartridges—his magazines—were not disconnected by packing, the tendency of the explosion was to find vent at the first hole. Hence he resorted to packing between the magazines, or, as it is technically known, "tamping."

"The magazines were eight in number, four in each gallery, so arranged that their explosion resulted in four craters, intersecting each other. The explosion was effected through tubes of pine wood six inches square, half filled with powder. These ran along the bottom of the tunnel, and entered the magazine through openings made for them. Between the pairs of the magazines and over the tubing was a layer of bags and logs.

"The fuses were those used for blasting in the coal mines of this State. When they were fired they became extinguished twice, but the third time the powder in the chamber, *six tuns* in all, was ignited with results that have already been described."

Gathering and Keeping Fruit.

It is becoming a well understood principle that pears are improved by being gathered before fully ripe. Some should approach nearer maturity than others. But early apples should be fully ripe, as a general rule, before gathering. Late fall and early winter apples should not be eatable when picked, and all the late winter varieties should be gathered when too hard to yield to the pressure of the thumb, and always before heavy fall frosts. A dry time should be selected, if possible. There will be a few specimens not yet mature, but you can afford to throw them out to save the best and the main crop. When a good keeping variety begins to drop freely from the tree, as is sometimes the case, secure the balance of the crop that remains on the tree as soon as possible; but they should not be mixed with those on the ground—not one should be saved with those picked. Windfalls will not keep, for in addition to the injury sustained from the fall, they become heated by lying upon the ground exposed to the sun and hot air, and the ripening process already commenced is hastening it to a rapid decay.

No matter how hot the weather is, an apple is always cool while upon the tree, and in that condition should be taken care of, if we would have it keep in its most perfect condition for the full development of all the delicious juices with which it is so abundantly supplied. How to obtain it in that condition will be my purpose now to show. We have seen that it must be carefully gathered before it is too ripe, as it is commonly termed; but I say before it is ripe, for when it it ripe it is fit to eat, and that should not be the case with winter apples when gathered.

We have also seen that heat hastens the ripening process, and that cold retards it. Apples should therefore be kept cool, barely so as not to freeze. A minimum temperature of thirty-four degrees is probably about right, with as little fluctuation as possible. It is not for the purpose of assuming to know more than the most of you about the best method of keeping apples, that I give the subject so large a space in this address, but it is to give it more prominence in our deliberations than it has heretofore had. I regard it as one of the points very much overlooked in all meetings of this kind.

Whether we regard the ripening process as a vital or a chemical action, it is quite sure that it should go on gradual and unchecked until all the good qualities are fully developed, and when the highest point of excellence is attained, then the fruit should be used. It is never so good as when just fully ripe; but is frequently eatable for a long time. Some varieties become dry and mealy, others tough and leathery. Others, by being kept very cool, will frequently remain in a very good condition for a very long time, or by the use of artificial means may be kept for an almost indefinite period.

I hold that the ripening process once commenced, goes on, no matter how cold, if frost is not present, slowly, perhaps, but uninterruptedly, until full maturity. Hence the importance of a cool cellar, which should always be dry and dark. It should be frequently aired, when the outside temperature will allow of it. Some varieties are much more sensitive to their treatment than others. The Winesap, for instance, which has a thick skin, may be abused a great deal in handling and but indifferently cared for in the cellar, and yet it will keep pretty well; that is it will rot but little; but, if kept close and warm, it is subject to a fungus that renders it scarcely tolerable to eat. But if it is kept cool and dry, all its best qualities are retained. It is also one of the varieties that do best to keep on open shelves. The Belmont, on the other hand, which I regard as one of the best and most profitable apples, is very impatient of bad treatment. Its skin is smooth and thin, and flesh of a delicate texture. If roughly handled and kept in a warm room it soon decays. If carefully handled and kept in a cool place, it keeps, with very little waste, till April or May. Indeed, it is, with me, one of the very best of keepers.—*Trans. Indiana Hort. Society.*

On the Forging of Steel.

George Ede, an English mechanic, has given a great deal of valuable practical information in his little pamphlet on the management of steel, published by D. Appleton & Co. From the work we make another extract:—

"Steel being one of the most valuable metals and requiring great care in the forging, hardening, tempering, annealing, and management of it in general, I think, after having had nearly twenty years' good practice, experience, and study combined, I am now able to give a little information to those who have not had so much to do with it as I have. All that I here state is from my own practical experience; and by following the plans I shall here give, the artist will meet with every success. There are many people who, for the want of a little useful knowledge on steel, refrain from making many a good tool, because they say it is sure to crack in hardening; but if the steel is good, and has not been spoilt in forging the article, then, by following my plans they never need be afraid that it will be a 'waster.' There are tuns of the very best steel condemned as bad steel—when, at the same time, it is the forging of it that has made it bad, through men not having a proper knowledge in the management of it; and those masters who study their own interest will employ those men for the forging of steel on whom they can most depend. For I have seen plenty of the very best steel destroyed, and have even heard men remark to each other, 'Make it well hot—it will work the easier;' and I felt what a sad thing it was to see men that knew better; yet they would destroy their employer's property. Therefore I say, as justice to the manufacturer and supplier of steel, it behoves masters to put those men only at the forging of steel on whom they can most depend.

"In forging of cast-steel the fire must be regulated by the size of the work; and in heating the steel, when the flames begin to break out, beat the coals round the outside of the fire close together with the slice to prevent the heat from escaping. To save fuel, damp the coal, and throw water on the fire if it extend beyond its proper limits. To ascertain the heat of the steel, draw it out of the fire, and that often, for it requires to be well watched to heat the steel properly; and if not hot enough, thrust it quickly in again. Soft coke is even better than coal for the fire. The heat the steel receives is judged of by the eye; and care should be taken not to use a higher degree of heat than is absolutely necessary to effect the desired purpose, and to use as few heats as possible; too frequent and overheating steel abstracts the carbon, gradually reducing it to the state of forged iron again. It is an idea of many men, that so long as the steel does not fly to pieces when they strike it with the hammer, it is not too hot; but it is an erroneous idea, and easily proved when it comes to be hardened and when it comes to be used; still it is an idea that many men will maintain, but only for the want of knowing better, and I hope that this will have the effect of altering their opinion. I can safely say that no man will ever injure the steel by being too careful how he takes his heats. Cast-steel may be welded by boiling sixteen parts of borax and one of sal-ammoniac together over a slow fire for an hour, and when cold grinding it into a powder. The steel must then be made as hot as it will conveniently bear, and the borax used as sand."

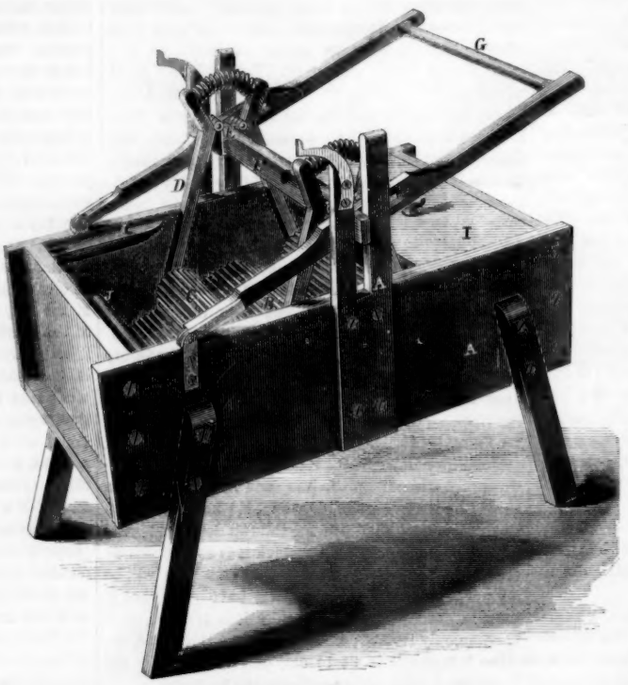
PRESERVATION OF FRUIT.—At the Russian Court fruit is preserved by being packed in creosotized lime. The lime is slacked in water in which a little creosote has been dissolved, and is allowed to fall to powder. The bottom of a plain deal box is covered with it one inch high, and over it is a sheet of paper. Upon this the fruit, well selected and cleansed, is arranged; over this another sheet of paper, and on top of this another such stratum of prepared lime; in the corners a little finely-powdered charcoal is put. The whole box is then filled in the same manner, and the well-fitting lid nailed down. Fruit kept in this manner will remain intact at least one year.

No less than twenty freight engines on the Western railroads have recently been altered so as to burn coal, it having been found that this is a cheaper fuel than wood. Ten more are in the work-shops to be altered in the same way.

Improved Washing Machine.

The terrors of washing day have well nigh disappeared before the perseverance and ingenuity of inventors. Machines for doing the hardest part of cleansing linen are now as indispensable as those for sewing. The machine shown herewith is easily operated and would appear to be efficient in action. Its construction is as follows:—

The box, A, is water-tight and has a large fluted inclined plane, B, extending from one end to the other. Upon this inclined plane two rollers, C, work, which are attached to the arms, D. These arms are hinged at E to the cross-piece, F, which permits them to open and shut as they rise with the action of the lever, G, one end of which is jointed to the case, A. The ends of the cross-piece are confined between slides, H, which insures certainty and efficiency of action. The covers, I (one of which is removed), keep the water from splashing about, and may be instantly removed when necessary. At the extreme ends of the case, A, there are wooden battens, J, which prevent the clothes from being pushed out by the action of the rollers. The operation of this machine is very similar to that of the old-fashioned wash-board, and the rollers rub the garments the same as the knuckles do. The clothes are rubbed in one place, but are thoroughly worked over by the rollers. This washing machine was patented, on June 28, 1864, through the Scientific American Patent Agency by Jos. Adams, of Janesville, Wis., and for further information address him at that place.



ADAMS'S WASHING MACHINE.

Balanced Slide Valve.

It has always struck us as singular that so few balanced slide valves are used on steam engines. They are most unquestionably of very great benefit when properly applied and not complicated in construction, and we hope that the inventors of such machines will take pains to introduce them to those using steam power. Even if the valve is not wholly balanced a large proportion of the friction may be taken off the seat with good results.

The engraving published herewith shows a balanced slide valve of an improved construction. The steam chest is not shown, but the bonnet which carries the working parts remains in place. Two systems are shown in this engraving—one in the valve, A, and the other in the plate, B. This plate, it will be seen, has a raised portion, C, at each end, which is slotted and carries a bar, D, and a rubber cushion, E, in the said slots. The valve, A, has a sliding cap, G, which works over a standard, H, screwed into the flange, and the springs, I, press this sliding cap up to the adjustable plate, B. This kind of valve and the india-rubber cushions are not used together for they are not necessary, but a solid adjustable plate, as at J, is employed, and the springs, I, fulfill all the purposes of a cushion. When the cushions are used, a solid valve without springs is employed. The plate, B, is adjusted as it wears by the set screws, K, and any steam that leaks through the back passes out through the opening, L, under the hemisphere, M. The valve may also be lubricated on the back through the port. A stuffing box and gland, N, is fitted to the bonnet so that live steam cannot leak through. This is a very neat arrangement, and the solid valve arrangement was patented on the 27th of October, 1863, through the Scientific American Patent Agency by M. H. Barnes, of Peoria, Ill.

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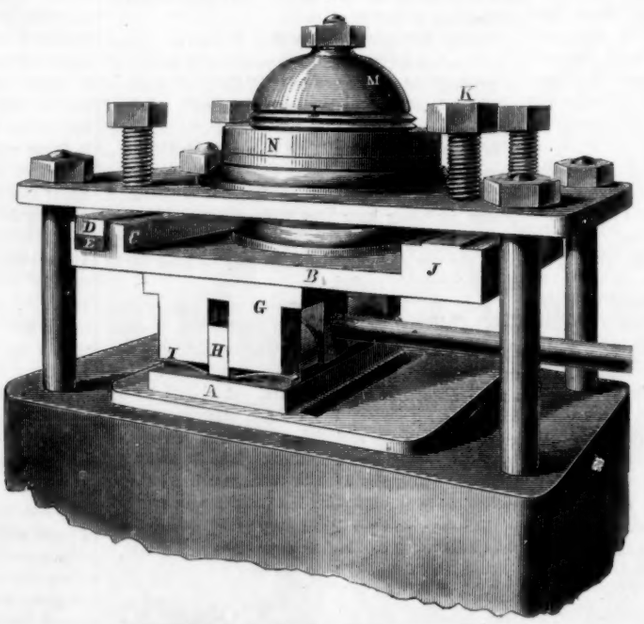

BARNES'S BALANCED SLIDE VALVE.

THE METAL MAGNESIUM.

There is no better authority in questions of photography, especially the science of the subject, than the editor of the *American Journal of Photography*. He makes the following remarks in relation to magnesium:—

"The metal magnesium has now been known for upwards of half a century. Its discoverer observed that it burns with a bright light, a fact which in the absence of any trial might easily have been predicted from the nature of its products of combustion. The magnesium light so much talked about is therefore no novelty; some one has, however, recently observed that wire is the most convenient form in which to have the metal for burning, and this clever observation has brought the light into great notoriety. The burning of magnesium wire is a very pretty and instructive chemical experiment; it is very interesting to see a silver, white metal ignite and burn vividly in a lamp flame. In our opinion, magnesium has not been found to possess any other practicable virtue.

"If magnesium were as cheap as lead, it might, under some circumstances, rival gas, or rock oil, as an illuminating material, and were it as cheap as silver, and at the same time could produce the brilliant magnesium light which some enthusiastic persons have seen, it might be useful for some photographic purposes, as a rival to the lime light. But the plain fact is that the intensity and brilliancy of this light have been enormously exaggerated. The light from a magnesium wire, burnt in a spirit lamp flame, is not greater and perhaps not more intense than a good coal-oil lamp will give, and it is not at all comparable with the lime light. But our enthusiastic English friends tell us that photographs have been made by it, and that it has extraordinary actinic properties. In the winter of 1840-41, a daguerreotype was made at night before a large audience, by means of the lime light, and since that time similar experiments have been, at least in America, a common lecture-room illustration. We have made an ambrotype by the light of coal-oil lamps, and it is a common thing to produce transparencies by gaslight. To believe the English journals, one Moule has been for years making photographs at night with a kind of gunpowder, etc., etc. This magnesium light is surely a case of 'great cry and little wool.'"

Important Law-suit settled.

The Biddeford, Maine, *Journal*, in announcing that the great sewing-machine suit in the United States Court, between Shaw & Clark, of Biddeford, on one side, and Wheeler & Wilson, Grover & Baker, Singer & Co., and Howe on the other, has been fully and finally settled, says:—

"The suit was brought by the large companies who combined to prevent the defendants from making and selling sewing machines, which they alleged infringed their patents. The best patent lawyers to be obtained were employed by both parties. After several years of tenacious and expensive fighting, the complainant succeeded in establishing their patent, and got out an injunction; but Shaw & Clark, in the meantime had obtained an interest in an older patent than theirs, and got the Government to extend it for seven years, with claims covering not only machines made by the complainants, but all the sewing machines of any kind now made in the country. This of course placed the 'boot on the other leg' at once, the result being that the whole matter has now been settled by Shaw & Clark receiving an interest valued at one million five hundred thousand dollars in the whole sewing-machine business. The old patent spoken of is now considered the most valuable of any in existence, except the rubber patent, as it will control the whole sewing machine interest of the country."

CIGAR-LIGHTERS.—It is very provoking, when one wishes to light a cigar or pipe, to see the last match one has go out in utter darkness. This annoyance is entirely dispensed with by the cigar-lighters advertised on another page. These lighters give a steady glow in wind or rain, and last much longer than an ordinary match. Those interested will be benefited by reading the advertisement referred to.

GAS from pine wood is to be made for lighting several of the continental cities of Europe. Such gas has been used in this country for many years.

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VOL. XI. NO. 8....[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, AUGUST 20, 1864.

Contents:

(Illustrations are indicated by an asterisk.)

ECONOMY OF FUEL.

There are two branches to this important subject; the first is the complete combustion of the fuel, so as to generate all of the heat possible; and the second is to transfer the heat thus generated from the hot gases which are the products of combustion to the water or other substance to be heated.

The condition necessary to effect perfect combustion is a temperature of about 1,000° above zero, and the contact at this temperature of each atom of hydrogen in the fuel with one atom of oxygen, and the contact of each atom of carbon with two atoms of oxygen.

Perhaps the best plan for realizing this condition yet reduced to practice is that employed in Roper's air engine. The fire is inclosed in an air-tight chamber, into which the air is forced by an air-pump, part below the grate and part above. The exit from this chamber is closed by a valve and opened at intervals, so that the air and the products of combustion are kept for some time mingled together in a close chamber where they are highly heated by the immediate presence of the fire. Under these circumstances it would seem hardly possible that a single atom of either hydrogen or carbon could escape without coming in contact with oxygen. Could not this method be applied to furnaces of steam boilers?

The plans for getting the heat out of the gases are yet very imperfect. A certain portion must be lost. It is of course impossible, even in theory, to obtain any more of this heat than the surplus above the temperature of the water in the boilers. In practice the gases go away at a temperature far above that of the water. While the temperature of the water ranges from 260° to 360°, that of the escaping smoke and gases in the chimney ranges probably between 600° and 1,000°.

As every pound of oxygen in the atmosphere is accompanied by 3½ pounds of nitrogen, which performs no part in the combustion, but which absorbs and carries away heat, there is a loss in the introduction of more air than is necessary to complete the combustion. The quantity of air requisite in theory would be that which should contain just enough oxygen to combine with all of the carbon to form carbonic acid, and with all of the hydrogen to form water. But if only this quantity were introduced, it is not probable that the substances could be so mixed as to bring each atom of the carbon and hydrogen in contact with the atoms of oxygen. In practice, therefore, it is necessary to carry in a surplus of air, but it is important that no more should be carried in than is sufficient to secure complete combustion. It will probably be found, also, that there is a proper proportion to be introduced below the grate.

No plan has yet been devised by which an engineer of ordinary intelligence can ascertain whether the products of combustion are wholly carbonic acid and water; that is to say, whether the combustion is complete. If our chemists could furnish some simple test of the presence of carbonic oxide, and of the hydro-carbons in the chimney, they would make a valuable contribution towards the perfection of the steam engine.

THE STEAM CAR ON THE SECOND AVENUE RAILROAD.

For a long time we have been hoping to see some movement of the city railway officials to introduce steam upon some portion of their lines instead of horses. This has been done at last, and it is owing to the energy and sagacity of Mr. E. S. Dickinson, the superintendent of the Second-avenue road. From 41st street to Harlem the company now run a car propelled by steam, not a "dummy," however, as it is absurdly called, for the steam exhausts into the smoke-pipe as does every locomotive. This is an experiment that we hope will succeed, and with the practical knowledge, judgment and good management of the superintendent, we do not see how it can fail.

The cost of running is the principal point in the substitution of steam for horse-power. All other objections, such as frightening horses, etc., are foolish and unworthy of notice. The expense of running is favorable to the steam cars, for in ordinary times a horse car cannot be run for less than $8 per day, while the former costs but $6. We have not counted the cost now in the deranged condition of the currency.

Distant readers may be pleased to know some of the details of this car. It is 22 feet long in the clear —4 feet being allowed for the engine and boiler; the width is 8 feet and it will seat thirty-three persons. The work inside is extremely neat and chaste, and the car itself was built by the Second-avenue Railroad Company.

The engines are two in number, connected at right angles and set at an angle with the platform. They have inverted cylinders, or the same as an ordinary stationary engine set up on end with the cylinder at top, and have pistons 5½ inches diameter by 12 inches stroke. They are geared to work on the forward axle of the car, and together with the spur wheel weigh 1,000 pounds. They have link motion, and are neat and creditable specimens of workmanship. The boiler sets on one side of the platform and the engine on the other; the former is about the hight of a man's head and has about fifty 1½-inch tubes. It makes ample steam to heat the feed water, which is contained under the seats inside the car, and also to warm it if necessary in winter. Coal is carried back of the engines in a little bunker not bigger than a common trunk, and the amount is sufficient to run ten miles. In addition to the feed pump there is also a Giffard injector supplied. The engine and the machinery were constructed by Messrs. Grice & Long, of Philadelphia, who have already made a large number of their machines, and we are glad to see that the Second-avenue road is giving them a trial. If they prove as successful on this line as they have on others, there will be a very great reform in operating city railroads. Besides running themselves, these cars can take an additional one behind and ascend a grade of over 200 feet in the mile, with ease.

MINES IN WARFARE.

The recent experiments in exploding mines before the besieged city of Petersburg have, as is well known by this time, proved unsuccessful. One attempt was made by our own forces, and the other by the rebels. So far as the mechanical success is concerned the mines were certainly effective, large portions of the rebel works being blown (as one active and precise statistician records) 300 feet in the air—doubtless a very great point gained. There is one requisite, however, which seems to have been overlooked in both cases, and upon that rests the failure of the two attempts; this is the necessity for an immediate and ferocious assault by overwhelming forces upon the surprised foe, as soon as the opening was made. Exploding a tun or so of gunpowder in a shaft or tunnel of a certain size is as sure to upheave the superincumbent portion as an earthquake, but powder without promptness is of little use; and when the deadly breach is made, it requires presence of mind and military genius to gain the desired point.

We may rest assured that mining in this way will do us but little good, and the enemy no harm whatever, *per contra*, it appears in the late assault that we suffered the most and that our mine was only a snare in which thousands of our men were slaughtered. While we mine the enemy countermines; the game is one that two can play at, but the force which adds energy in assault to the surprise gained by the sudden destruction of the enemy's defenses cannot fail of a substantial reward.

CONCERNING BOILER EXPLOSIONS.

In commenting upon these disasters we have endeavored to account for them from strictly legitimate and practical conclusions, and have deprecated the attempts which are made to give the subject a false issue by throwing the blame upon some mysterious gas, some theory more intricate and curious than sensible, or some other cause quite as far from the true one. We are not so dogmatic or downright in our assertions as to say positively that from one cause and no other boilers will inevitably explode; but this we say—and it is the fact in three-fourths of all the explosions which occur—that more accidents in the use of steam occur from positive neglect, or its equivalent, than from anything else. In the case of the Martin boiler which exploded on the *Chenango*, one witness occupied many hours in an attempt to prove that the disaster was wholly due to the presence of highly superheated steam in the boiler which suddenly converted the remaining water into steam of a dangerous pressure on opening the throttle valve. No sooner is some elaborate theory propounded than the results of practice utterly neutralize it, and the sophism of it is clearly shown. The experience of those in charge of the *Golden City*, one of the Pacific Mail Steamship Company's ships, is a case in point. This vessel has Martin boilers, and on her very first trip down the coast, on her way to California, the water got low, the tops of the arches were heated red hot, and were forced down by steam pressure, but no explosion followed; and the ship returned to port, was repaired, and is now doing good service on her route. Now if we assert that boiler explosions are due to obscure and not natural causes, it is but reasonable to assume that superheated steam in this instance—for there is no doubt of its existence—would have caused as much damage as in any other. Not only in this but in every other boiler where it is generated. In every upright tubular boiler there is always more or less of it, at a greater or less degree of temperature, and if it is dangerous in one cause it certainly will be in another.

Boilers are now building in this city, not upon Martin's plans, however, for a United States steamer, which have superheating chambers in the upper part, so that the heated gases from the furnaces pass through tubes in the steam chamber. If superheated steam is a source of danger, these boilers are infernal machines that should never be allowed to pass inspection.

THE CURRENCY QUESTION.

"The greatest care will, however, be requisite to prevent the degradation of such issues into an irredeemable paper currency, than which no more certainly fatal expedient for impoverishing the masses and discrediting the Government of any country can well be devised."—SECRETARY CHASE.

The opinion extensively prevails that a further issue of Treasury notes will make money more plenty, and will thus increase the ability of the people to supply Government with the means of carrying on the war. We have no doubt that this opinion is unsound, and we think the mistake results from confounding money with capital.

In November 1861, the Secretary of the Treasury stated the bank circulation of the loyal States at 130 millions of dollars, and the specie in circulation could not have exceeded 70 millions, making the money of the country 200 millions. By the census of 1860 the wealth of the loyal States is returned at 10,716 millions of dollars. So that the money of the country was less than two per cent of the property of the country.

If there had been no property in the country but 200 millions of money, no issue of Treasury notes, and no other contrivance, would have enabled the Government to support the war for a single season. What is requisite for carrying on the war is a supply of beef, flour, horses, wagons, coffee, gunpowder, harnesses, iron, timber, and the various other forms of property which are required in naval and military operations. The capital of the country is made up of these things; the money, as we have shown, amounting to only two per cent of the whole. When capitalists make a loan to the Government, money is temporarily used to effect the exchange, but the final transaction that really takes place is a transfer of flour, beef, or some other kind of merchandise from the possession of the capitalist to that of the Government.

When one man has a debt due him from another, it is generally an error of speech to say that he has money at interest. In most cases the debtor has but a small proportion of the amount of his debt in money; but, if the debt is good he has the whole amount in some other kind of property. If the debtor sells his wheat and oxen to the Government and pays his debt, and the creditor invests the amount in Government bonds, a portion of the capital of the country is consumed in military operations, while the money in the country remains just the same as it was before. All the use of the money in the transaction was to facilitate the exchange of the property; enabling each man to exchange a given value in the property which he had for an equivalent value in the kind of property that he wanted. And this is the only use of money in human affairs. Wealth, property, capital, in its various forms, has innumerable uses, but money has only this one use. It is a convenient instrument to employ in making exchanges of property.

When a capitalist has loaned his property to the Government, the only way that he can make a further loan is by accumulating more property. Ask any individual capitalist how the issuing of more Treasury notes is going to increase the amount of capital that he has to invest in Government bonds.

THE HECKER AND WATERMAN EXPERIMENTS.

We give this week the results of Mr. Waterman's calculations of the quantity of steam condensed in doing the work that was done. Mr. Joule ascertained that the quantity of heat which will raise the temperature of one pound of water one degree, is just sufficient, if expended in mechanical work, to raise 772 pounds of matter one foot high. This quantity of heat is called a unit. It is found that whenever heat is employed to produce mechanical effect, for every 772 foot-pounds of work done one unit of heat is destroyed. When a portion of the heat in saturated steam is destroyed, a corresponding portion of the steam must be condensed. As the quantity of heat required to evaporate water at given temperatures is known, if the quantity of heat destroyed can be ascertained it is easy to calculate what portion of steam would be condensed in consequence.

Mr. Waterman computes the work performed by the engine by multiplying the mean pressure on the piston into the length of stroke. He then calculates how many units of heat this amount of work would consume, taking 772 foot-pounds to each unit. We accompany the figures with such of those already published as have a bearing on this branch of the subject.

The series tried from May 17th to May 27th; engine worked as a condenser, without steam in the jacket.

Pounds of feed-water pumped into boiler from tank—

⅞ths cut-off	16,622
¾ds cut-off	14,981
½ cut-off	14,568
¼th cut-off	12,826

Pounds of steam in cylinder at end of stroke—

⅞ths cut-off	10,350
¾ds cut-off	8,334
½ cut-off	7,912
¼th cut-off	6,313

Percentum of steam condensed in cylinder—

⅞ths cut-off	37·8
¾ds cut-off	44·3
½ cut-off	45·7
¼th cut-off	49·2

Pounds of steam condensed by doing work, computed from Joule's equivalent—

⅞ths cut-off	943·37
¾ds cut-off	953·46
½ cut-off	972·09
¼th cut-off	1117·12

Percentum of steam of the whole quantity evaporated condensed by doing work—

⅞ths cut-off	5·73
¾ds cut-off	6·24
½ cut-off	6·68
¼ths cut-off	8·71

The series tried from May 12th to June 4th; engine worked as a condenser, steam in jacket.

Pounds of feed-water pumped into boiler from tank—

⅞ths cut-off	12,901
¾ds cut-off	11,267
½ cut-off	11,188
¼th cut-off	9,632

Percentum of steam condensed in cylinder—

⅞ths cut-off	15·4
¾ds cut-off	21·3
½ cut-off	28·4
¼th cut-off	10·4

Pounds of steam condensed by doing work, computed from Joule's equivalent—

⅞ths cut-off	913·25
¾ds cut-off	875·9
½ cut-off	929·67
¼th cut-off	876·19

Percentum of steam of the whole quantity evaporated, condensed by doing work—

⅞ths cut-off	7·01
¾ds cut-off	7·78
½ cut-off	8·22
¼th cut-off	9·32

The series tried from April 1st to April 26th; the engine worked as a non-condenser, steam in jacket.

Pounds of water pumped into boiler from tank—

⅞ths cut-off	15,571
¾ds cut-off	13,056
½ cut-off	12,604
¼th cut-off	10,394

Percentum of steam condensed in cylinder—

⅞ths cut-off	11·3
¾ds cut-off	11·3
½ cut-off	7·9
¼th cut-off	9·7

Pounds of steam condensed by doing work, computed from Joule's equivalent—

⅞ths cut-off	1479·76
¾ds cut-off	1514·60
½ cut-off	1335·2
¼th cut-off	1140·37

Pounds of steam of the whole quantity evaporated, condensed by doing work—

⅞ths cut-off	9·45
¾ds cut-off	11·61
½ cut-off	10 6
¼th cut-on	10·98

These calculations and their results are interesting. Regnault's experiments led him to the conclusion that the power of a steam engine is in proportion to the heat lost by the steam in the part of the engine performing the work. To obtain, therefore, the whole power of the heat, it would be necessary to perform work enough to condense all of the steam; and if only sufficient work is done to condense 10 per cent of the steam, it follows that only one-tenth of the power of the heat is obtained. It will be seen that in these experiments the work was sufficient to condense from 5¾ths to 11⅔rds per cent of the steam. The facts will doubtless suggest also many other points for reflection to intelligent engineers.

As statements, however, of the actual condensation of steam in the cylinder by the destruction of heat in doing work, we do not consider them as reliable. While the steam port is open the expansion takes place in the boiler as well as in the cylinder, and the heat destroyed in the boiler is renewed from the furnace. There are so many ways, too, in which work may be done, such as disturbing the atmosphere, in friction of the steam against the walls of the passages, and other modes, that we should consider an ordinary steam engine as a clumsy apparatus for measuring it. We have confidence in the correctness of the calculations, they have been made from approved formulas, and have been carefully checked.

THE NEW LAW FOR MEASURING SHIPS.

The law heretofore in force in this country for measuring ships was very defective, as we have repeatedly pointed out. But three dimensions were taken, one of length, one of breadth, and one of depth, so that the vessel's tunnage was ascertained with no reference to its lines, and with very distant approach to accuracy. It always gave the tunnage much greater than it really was. At its last session Congress passed a new law for the measurement of vessels, which will make the measures much more accurate than those by the old method. But the rules established by the new law are exceedingly complicated and clumsy, and they do not give accurate results.

An approximate estimate is made of the cubic contents of the vessel below the deck in feet, and each 100 cubic feet is called a tun.

The directions for ascertaining the cubic contents of a large vessel (over 250 feet in length) are to divide the length into 16 equal parts, and to measure the area of the cross section at each division. To get the area of the cross section the depth is divided into four equal parts, and the breadth measured at each division, as well as at the top and bottom, making five measurements of breadth at each transverse section. Commencing at the top, the second and fourth breadths are multipled by four, and the third by two, the products are added together, and to them are added the first breadth and last. The sum is multiplied by one-third of the common difference between the breadth, and the product—whatever it may be in mathematics—is pronounced in law the transverse area.

Then from the several areas the cubic contents are obtained by a process not less round-about, and equally inaccurate. For smaller vessels the process is the same except that fewer cross sections are measured. It seems to us plain that it would be much easier to teach any person to compute the contents of a vessel with perfect accuracy by dividing the portions between the several cross sections into regular geometric figures, prisms, wedges, and pyramids, as is done in computing earthwork, than it would to teach this complicated and inaccurate rule. A simple enactment that the tunnage of a vessel should be ascertained by dividing the cubic contents below the deck in feet, by 100, would express the intention of Congress with more precision than these clumsy rules, and there would be no difficulty in understanding the law.

A Trip in a Fire Balloon.

M. Eugene Godard, with five companions, made an ascent from Cremorne Gardens, in London, on the 20th July, in an enormous balloon of his own construction, which he styles "The Eagle." In this machine M. Godard discards gas, and goes back to the ordinary original Montgolfier balloon, which is commonly known as a "fire balloon." It is 117 feet 7 inches in hight, 95 feet 9 inches in circumference, 300 feet 6 inches superficial, 30,000 feet in area, 2,005 lbs. in weight, 498,556 cubic contents.

In the center of the car is an 18 feet stove, including the chimney, 980 pounds in weight; three cylinders, three inches apart from each other, invented by M. Godard, with a view to counteract the effects of the radiated heat upon the occupants of the car. Inside the flue is a metal colander to intercept sparks. The combustible employed is rye straw, cleaned from the ears and compressed into blocks. The total weight of the balloon (including the grappling-iron cords, 400 lbs. two supplementary pumps, 150 lbs., and combustible 500 lbs.) is 4,620 lbs. The inflation only took forty-five minutes; and M. Godard says that, under favorable circumstances he can fill and start in less than half an hour.

At a quarter to 8 the whole fabric stood up amongst the trees and poles of the ground, and the various ropes that held it to the earth were cut away one by one. M. Godard ran rapidly round the solid wicker car, shouting orders through a speaking trumpet with pardonable excitability. One of M. Godard's companions gives the following account of the voyage:—

"Let the reader imagine that he has been riding in the engine of an express train; let him then conceive that this engine, with the fire roaring in the furnace, has suddenly leaped into the air, and he will get some faint notion of the situation.

"There was not much wind, and the balloon, slowly rising, took its course to the south-eastward of London. At times it seemed becalmed, and during these intervals of quiet those who looked out over the panorama of London owned that the sight was well worth the risk. The red light glared out and was seen afar; the heat was almost painful, but neither amongst Englishmen nor Frenchmen was a murmur heard as steadily, one after one, the trusses of straw were passed into the fire. At no time did the balloon ascend much above half a mile, and at no time did that ugly roaring crackling clamor cease; but M. Godard was bland and brave; his fellow-countrymen were courteous and courageous, and the Englishmen held their tongues.

"At length, after crossing and re-crossing the river, it was determined to descend. Three times already had the balloon passed over the Thames, and when it was resolved to alight, M. Godard was over the Isle of Dogs. He had affixed his eye however, upon the East Greenwich marshes as an open space in which the descent could be safely attempted

Very nicely and skillfully calculated were his manœuvres. Traversing the Thames at an exceedingly low elevation, the balloon just grounded upon the shore, within a dozen yards of the water.

"Distinctly to understand the fierce excitement of the next three minutes, it should be borne in mind that the fire was still roaring merrily away; that the machinery, so admirable for its special purposes, would have caused sad havoc had there been anything like a general upset; and that at this particular moment six men could exert very little control over a balloon capable of containing 460,000 cubic feet of air.

"Touching the shore, the balloon tore away, the big canvas flapping, the bright fire burning; while right in front rose a stone embankment. The shocks were rough, and had the travelers been novices in this particular method of locomotion we might now have some awkward casualties to relate. Just before each bump, however, the men made a little leap, and thus balked its force, as a cricketer to catch a ball draws back his hand instead of protruding it. Still, with all these precautions, it seemed half an hour—and there was a strong inclination to cheer when the threatening stones were passed. On now into a potato-field; another rise; a wild tendency to leap at a chimney; a strong 'exhibition' of restraint in the shape of a hundred sensible Englishmen tugging away at the ropes, and obeying the orders that were given—and the whole thing was over."

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Machine for milking Cows.—Most of the devices heretofore invented for milking cows involve the general idea or principle of suction. Rubber gloves are stretched upon the animal's teats, and suction is produced by working a small pump. In the present improvement all suction is avoided, and by an ingenious arrangement of mechanism each teat is seized and squeezed, first at the neck of the teat, then in the middle, and lastly, at the extremity, thus closely imitating the operation of hand-milking. H. V. Belding, of Oppenheim, Fulton county, N. Y., is the inventor.

Round and Half-round Files.—The ordinary round and half-round files are constructed by first rolling or swaging the steel in the desired form, technically termed blanks, and these blanks are then cut in order to form the file. The flat files may be constructed in this way in a perfect manner, but round and half-round files cannot be perfectly cut, as the cutting tool destroys the rotundity of the surface, which, instead of being round or half-round, is of polygonal form. By this improvement these files can be made with a perfect curved surface, either circular or semicircular in its transverse section. To effect this the blanks are constructed out of sheet-steel plates of any desired dimensions, according to the size of file required, and said blanks are cut either manually or by a machine, in the same way as the ordinary flat or tri-lateral files. These plates are then heated and bent so as to form a circle or semicircle in their transverse section, and then tempered. The files thus constructed may remain in shell form or in cases where weight and solidity are required, they may be filled with wood or soft metal, a tang to receive a handle being attached to one end of them. By this arrangement a file of the kind specified is obtained with a perfect curved surface, and consequently one which will operate much more perfectly than those constructed in the ordinary way. Besides a saving in metal is effected as well as in the cost of manufacture. J. Nelson Jacobs, of Worcester, Mass., is the inventor.

Breech-loading Fire-arm.—This invention relates to an improvement in that class of breech-loading fire-arms in which the breech is closed by a breech-block sliding transversely across the bore of the barrel. The invention consists in the employment of a a valve and screw in combination with the transversely sliding breech-block in such a manner that when the latter is in position, by turning the screw the valve is set up tight against the end of the barrel and a perfect joint between the breech-block and barrel is effected; the invention consists, also, in a notched socket in the inner surface of the breech-block in combination with a flanged expansion washer, the stem of which fits into said notched socket and can be locked therein by a suitable bolt or other equivalent device, in such a manner that said flanged expansion washer will move in and out with the breech-block, requiring no separate handling, and when said washer is worn out it can be easily removed and replaced without loss of time. Alfred Krupp, of Essen, Prussia, is the inventor. For further information address Thos. Prosser, No. 28 Platt street, New York.

Improved Cigaretto.—Cigarettes, as usually made, are formed by wrapping a small quantity of fine-cut tobacco in a sheet or piece of paper and folding in the ends. In using these cigarettes it is well known that the tobacco is constantly escaping into the mouth and that an unpleasant odor is caused by the burning paper. This invention obviates both these difficulties; first, the paper is prepared with a view to obviate this disagreeable odor and taste of the paper; and secondly, the end that is inserted in the mouth is so formed that the tobacco cannot escape, and yet a free draught is insured; and to effect this, the invention consists in the employment or use of a mouth-piece made by coiling a short piece or strip of stout paper or thin pasteboard, and inserting the coil in the end designed for the mouth, or, more properly speaking, by winding and pasting the paper tube around this mouth-piece which gives the size to the cigaretto. This mouth-piece forms a firm hold for the teeth and is of sufficient length to prevent the fire reaching the lips when the cigaretto is nearly consumed. The cigarettos are about the length of an ordinary cigar, and nearly a half-inch in diameter.

We have tried the article and find it to be a very good thing. The filling of those we have used was of the finest Turkish tobacco, thus giving the benefit of the best tobacco in the convenient shape of a cigar, and withal we consider the cigaretto a very good, convenient, and economical article for smoking. The inventor of the above is E. Berg, of New York City, and the patent bears date August 2, 1864, and further particulars may be had of Messrs. Berg & Co., manufacturers, 133 Chatham street, New York city.

Zopissa.

Is a composition invented by Mr. Szerelmy of London, which has of late acquired quite a reputation, on account of the manifold uses to which it can be applied. Among specimens that have been exhibited, are pieces of tile, chalk gypsum and soapstone, coated with the zopissa composition. Articles of wood and iron which had been exposed for over a year to the influences of the London atmosphere and to sea water, were found not to have been affected by either rust or decay. A cheap and artistic imitation of leather has been made out of cotton tissue, impregnated with the zopissa, and well dyed, imitating the various colors and shades of water-proof animal leather.

GRAFTING ANIMALS.—The *Intellectual Observer* says:—"Dr. Paul Bert has published a work on the curious subject of animal grafts. He succeeded in making Siamese twins of a couple of rats, and in many other monstrosities. He exclaims, 'it is a surprising spectacle to see a paw cut from one rat, live, grow, finish its ossification, and regenerate its nerves, under the skin of another, and when we plant a plume of feathers under the skin of a dog, what a miracle to see the interrupted vital phenomena resume their course, and the fragment of a bird receive nourishment from the blood of a mammal.'"

SALMON eggs have been successfully transported from England to Australia, although the voyage occupied more than three months. Two or three ova boxes were kept at Melbourne, and others were sent to Tasmania. On being removed to the hatching boxes in the ponds, a large portion of the ova was found to be dead, but those that remained alive amounted to many thousands, and are amply sufficient, if they should all continue to thrive and become living fish, to insure the complete success of the experiment, and stock the waters of Australia with the most delicious known table-fish.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING AUGUST 9, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

43,752.—Knife and Scissors Sharpener.—William H. Alcorn, New York City:

I claim the use of a file, C, secured by sleeves, D, or their equivalents to a horisontally swinging lever, B, in combination with guide strips, d, or notch, e, to retain the knife or scissors to be sharpened substantially in the manner and for the purpose shown and described.

[This invention consists in the employment of a three or more sided file, attached to a horizontally-swinging lever by means of sleeves, so that it can be readily removed and turned to bring a fresh side into use, in combination with a suitable socket to hold a knife or a pair of scissors in such a manner that when an oscillating motion is imparted to the lever, and the knife or scissors are placed into their respective sockets, the file will act on the cutting edge and sharpen the same in a simple and easy manner.]

43,753.—Mode of locking Railroad Car-seats.—David H. Baker, Jersey City, N. J.:

I claim a movable locking bar extending along the car, the distance of several seats, and fitted with pins, hooks or slots, substantially as specified, in combination with the movable backs of the seats and the locking device whereby said locks can be all locked or unlocked simultaneously, by moving the said bar as set forth.

43,754.—Milking Machine.—H. V. Belding, Oppenheim, N. Y.:

I claim the use of one or more pressers, G G', acting substantially in the manner and for the purpose herein shown and described.

I also claim the combination of the plates, L L', with the pressers, G, G', substantially as herein shown and described for the purpose set forth.

I also claim the combination of the winged shaft, E, with the pressers, G G', substantially in the manner and for the purpose herein shown and described.

I also claim the springs, H H, in combination with the pressers' G G', substantially as herein set forth.

I also claim the adjusting screw rods, I, in combination with the plates, L L', substantially as and for the purpose herein shown and described.

I also claim the arrangement of the pan, K, with the pressers, G G', and plates, L L', as herein shown and described.

43,755.—Pump.—Wm. A. Bemis, Lyndon Center, Vt.:

I claim a pump provided with two plungers, the rods, E E', of which are connected by a lever, G, having rods, H H, and levers, I I, connected to it and all arranged with a platform, F, to operate substantially in the manner as and for the purpose set forth.

I further claim in combination herewith the packing, e, arranged and applied to the plungers, D D', to operate in the manner described.

[This invention relates to a new and improved pump, designed for general use, and it consists in the employment or use of two plungers or pistons, the rods of which are connected by a lever and having other levers applied to them and all arranged with a platform in such a manner that the person in operating the pump may apply his power to it in the most favorable and advantageous manner. The plungers or pistons are also packed in such a manner as to ensure the perfect working of the same with but little friction.]

43,756.—Bee-hive.—T. F. Bingham, Gowanda, N. Y.:

I claim, first, A bee-hive constructed with triple walls, a b c, with spaces, d d, between them, substantially as and for the purpose specified.

Second, The bee-entrance, composed of two parts, f f,, both parts being provided with openings or slots and the inner one, f, made adjustable, substantially as and for the purpose specified.

Third, The comb-frames composed of the horisontal bars, s t, and pendant bars, u u, all arranged and combined as and for the purpose specified.

Fourth, The rim, A, in combination with the cover, B, arranged and applied as and for the purpose specified.

[This invention has for its object the obtaining of a bee-hive which will effectually protect the bees during the winter season, and the providing of the same with an entrance well adapted for it and which will be capable of being adjusted to suit the various circumstances required in bee-culture. The invention also has for its object the constructing of the comb-frames in such a manner that they will economize in space and at the same time effectually support the combs; the invention has further for its object the obtaining of an extension cap to the hive so arranged that supplemental spare honey-boxes may be added or applied when necessary, and also the employment or use of a box and cap for the proper feeding of the bees when needed.]

43,757.—Valve Gear for Steam Engines.—I. W. Bowers, Cincinnati, Ohio. Ante-dated Jan. 27, 1864:

I claim, first, Operating the valve, H, by the lifters or their equivalents when they are arranged within the valve-chamber as shown and for the purpose described.

Second, The combination of the valves, H, rock-shaft, m, and cranks, m, with the weights, m''', substantially as described and for the purpose set forth.

Third, The several devices in combination, by which the port or steam-valves and the exhaust or outlet valves are operated, when combined substantially as described and for the purpose set forth.

Fourth, the combination of the forked-sliding bar, L, with the vibrating bar, K, and cam rod, D, when constructed and arranged, substantially as described.

Fifth, The construction and arrangement of the connecting bar, g, and pails, r r, with the cranks, m m, when constructed substantially as described and for the purpose set forth

43,758.—Soap.—D. B. Chapman, Hopedale, Mass.:

I claim the compound soap made substantially as hereinbefore described.

43,759.—Automaton Dancer.—Isaac S. Clough, Brooklyn, N. Y., and Vincent Fountain, Jr., North Shore, N. Y.:

I claim suspending the figure, A, from an elastic cord, B, stretched between uprights, C, over the sounding dusk, E, attached to the platform, D, so that the motion of the figure is produced by the swaying of the cord and the contact of the feet of the figure with the bell or disk produces a musical sound.

[This invention consists in suspending a figure with jointed limbs,

from anelastic cord stretched between uprights, over a suitable plat form in such a manner that by touching the cord with the finger the feet of the jointed figure are caused to touch the platform and if the taps on the cord are repeated in quick succession the figure begins to dance on the platform.

43,760.—Composition for desulphurizing Coal.—Jos. H. Connelly, Wheeling, West Va.:

I claim the use of desulphurizing agents such as common salt and lime in combination with petroleum or its products forced in the form of spray in a steam boiler, or other furnace substantially in the manner and for the purpose herein specified.

[The object of this invention is to mix with the petroleum a certain desulphurizing composition which when forced by a jet of steam into the furnance combines with the sulphur and destroys its quality to combine with the iron.]

43,761.—Ferrotype Card-mount.—John H. Daniels, Boston, Mass.:

I claim as a new astride of manufacture a plate or card mount, made of a single sheet of paper recessed for the reception of the card or plate and perforated so as to frame the same in the manner substantially as herein set forth.

I also claim the method herein described of cutting and recessing plate or card mounts at one operation.

43,762.—Elastic Stud or Button.—A. Eliaers, Boston, Mass.:

I claim forming an elastic hollow socket with a projecting rim or shoulder on its inside that fits into a corresponding groove on the outside of the article to be protected as described.

43,763.—Apparatus for Signaling.—Philip Howard Colomb, Fulham, Kingdom of Great Britain:

I claim, first, the use for night signaling, of a light (or lights) shewn or exposed during varying points of time regulated as described.

Second, The use for day signaling, of an opaque or other clearly visible body (or bodies) shewn or exposed during varying periods of time regulated as described.

Third, The use for the purposes described of a notched bar or other equivalent arrangement for enabling the levers or other connecttons whereby motion is imparted from the pins' projections, depressions, or holes, to be adjusted so as to be acted upon by the required sets of projections depressions or holes, or to be shown out of action as required.

Fourth, The employment of levers, or equivalent parts, adjustable endwise upon an angular or other bar, for the purpose of imparting the motion received from the projections, depressions or holes, so as to regulate the appearance and disappearance, or expansion and contraction or exchange of position or form, of the signaling object or objects.

Fifth, The use of a drum, endless belt, chain, or equivalent arrangement, provided with projections, depressions or holes, and capable of being driven with a continuous motion for the purpose of regulating the appearance and disappearance, expansion and contraction or change of position, or form of figures or objects used in signaling.

43,764.—Tuyere for Blast Furnaces.—William M. Everett, Malden, N. Y. Ante-dated Feb. 4, 1864:

I claim, first, The combination and arrangement of the removable bottom, R, with the conical portion of the tuyere, O, and the beveled pieces, S S, substantially as and for the purposes set forth.

Second, In the combination and arrangement of the adjustable slide, C, with the arm, D, and the arm E, and the set screw, J, substantially as and for the purposes set forth.

43,765.—Machine for surface-sizing Fibrous Materials.—Wm. Fuzzard, Malden, Mass.:

I claim, first, A revolving brush cylinder, D, or its equivalent, in connection with a partly submerged roller, C, and an adjustable roller or bar, E, arranged to operate in the manner substantially as and for the purpose herein set forth.

Second, The combination of the reciprocating toothed bars, B B, and toothed rock shaft, E e, constructed and operating as and for the purposes specified.

Third, The swinging plate, G, composed of one or more parts and placed on the box or case, A, when used in connection with the toothed bars, B, for the purpose set forth.

Fourth, The metal screen, J, placed at the outer ends of the bars, D, when used in connection with the toothed bars, B, for the purpose set forth.

Fifth, The reciprocating bar, O, provided with notched plates, j, and fitted in a box, N, having a perforated bottom, t, for the purpose of conveying the tailings into the elevator box, P, as set forth.

[This invention relates to a new and improved machine for separating grain from straw, as the latter is delivered from a thrashing machine.]

43,767.—Miter Dove-tailing Machine.—Franklin A. Gleason, New York City:

I claim the construction and arrangement of the dovetail cutters, the V-cutter, s, the stops, P and r, the base from which to set the miter cutters, e e, the oblique position of the cutter edges, the base, R, in combination with the adjustable bed-plates, G G', substantially as described

43,768.—Obtaining and transmitting Power.—James Joseph Gorman, Cincinnati, Ohio:

I claim, first, The variable fulcrum, c c' c'', in combination with the oscillating frame, B, carrying the weights, D D', and with the rolling weight, E, constructed and operating in the manner and for the purpose substantially as herein shown and described.

Second, The weights, g'' g''', arranged in combination with the rolling weight, E, automatically rising and falling guide ways, i, stationary frame, G, and oscillating frame, B, with weights, D D', all constructed and operating in the manner and for the purpose substantially as set forth.

Third, The dog, I, spring, O, and rocker-arm, M, and cam, S, with cavities, l l', in combination with the oscillating frame, B, or its equivalent, and with the shaft, K, constructed and operating substantially as and for the purpose set forth.

Fourth, The spring, O, and rock shaft, o, in combination with the hooked rod, P, eccentric wrist pins, q q', dog, I, cam, J, shaft, K, and oscillating frame, B, or its equivalent, constructed and operating in the manner and for the purpose substantially as described.

[The object of this invention is to produce power by a peculiar arrangement of weights and levers, and to avoid the dead centers in transmitting the power thus obtained by a peculiar arrangement of cranks and arms.]

43,769.—Steam Generator.—Solomon Greenhalgh, Newark, N. J.:

I claim the trapezoidal steam chambers, F, arranged in combination with the horizontal water tubes, A, vertical tubes, E, water backs, H, plates, I, and abutments, c d d', in the mannor and for the purpose substantially as herein shown and described.

[This invention relates to certain improvements in that class of steam boilers which are used to generate steam for heating purposes. In such boilers it is particularly desirable to obtain the steam as dry as possible, so that the same, in passing through the heaters in the various parts of the building to be heated, will deposit the smallest possible quantity of water.]

43,770.—Apparatus for forcing Water by Pneumatic Pressure.—John P. Gruber, New York City:

I claim, first, In a fountain which is to be operated by the elastic pressure of condensed air, the arrangement herein described, that is to say, a reservoir containing the water or other liquid to be operated upon so contrived that it may at pleasure be subjected to, or relieved from, the elastic pressure of condensed air, in combination with a valve so constructed and arranged that it shall automatically close when the pressure is applied and open when it is removed, substantially in the manner and for the purpose herein-before set forth.

Second, In a fountain which is to be operated by the elastic force of connensed air, I claim so constructing the same that the valve through which the fluid is to be received into the reservoir shall be kept closed by the pressure of the air from within, and shall open automatically when that pressure is removed, substantially in the manaer and for the purpose herein-before described.

43,771.—Hearth of a Cooking Stove.—George Himrod, Chicago, Ill.:

I claim, first, Supporting the removable top, B, upon the isolated supports, a, arranged and operating substantially as and for the purposes herein specified and shown.

Second, In combination with the above I claim the employment of the stops or projections, b, for the purposes specified.

43,772.—Pointing Wire for Pins.—Orin L. Hopson and Herman P. Brooks, Waterbury, Conn.:

We claim, first, Pointing wires or rods by a revolving divided die that is pressed together, substantially as and for the purpose specified.

Second, We claim the arrangement of the adjustable radial cams, k, revolving shaft, b, jaw, d, and dies, i, substantially as specified.

Third, We claim the ring, f, and screw, g, in combination with the jaw, d, and dies, i i, for regulating the amount, said dies shall be allowed to open, as set forth.

43,773.—Machine for making Flour-sacks.—J. M. Hurd, Auburn, N. Y.:

I claim, first, The two leaves, A and B, or their equivalents, substantially as and for the purpose specified.

Second, I claim the combination of the two leaves, A and B, with the lever, K, substantially as above specified.

43,774.—Apparatus for heating Glue.—Robert Jackman, New York City:

I claim a glue-heating apparatus adapted to apply steam directly to the water in which the kettles are immersed and to supply a liberal quantity of distilled water when required, substantially in the manner and for the purposes herein set forth.

44,775.—Construction of Round and Half-round Files.—J. Nelson Jacobs, Worcester, Mass.:

I claim the process herein described of constructing round and half round files, to wit, by forming the blanks of flat metal plates, cutting the same, and then bending them in the round or half round form.

43,776.—Device for cutting Tenons on Metallic Rods, etc.—C. Jillson, Worcester, Mass.:

I claim the combination of the cutter, eye, and gage, operating together, substantially in the manner and for the purpose described.

43,777.—Machine for dressing Weaver's Harness.—John and Joseph H. Kendrick, Providence, R. I.:

We claim, first, The method, substantially as specified, of dressing weaver's harnesses by the combination of a reciprocating carriage, H, upon which the harness is strained, with brushes, G G, or their equivalents, revolving in the same direction, between which the harness to be dressed is made to travel, as herein described.

Second, The mode of operation, substantially as specified, by means of which the revolving brushes, G G, or other equivalent instruments for dressing the harnesses are made to have a motion relatively to each other and to the harness carriage, so as to act upon the harness only during its movement in one direction, as herein described.

43,778.—Machine for making Chains.—L. King, Cleveland, Ohio:

I claim constructing a chain, of the form herein represented, from a single rod or wire, by one continued process, by means of an automatic machine, constructed, arranged, and having all its parts operated substantially as described.

43,779.—Bee-hive.—Joseph Lash, Mount Vernon, Territory of Nebraska:

I claim, first, The ventilators, F F, in combination with the trough, E, substantially as shown and described.

Second, The tube, D, constructed and used substantially as set forth, in combination with the ventilators and trough or trap.

43,780.—Machine for loading Metallic Cartridge Cases.—Charles H. Lavis, Philadelphia, Pa.:

I claim cutting a groove, l, in the under face of the loading wheel, B, and fastening a block, m, with one or more resting flats, c and d, and one or more inclined planes, a and b, on its upper face to the bed plate, A, the groove and block being arranged with reference to each other, substantially in the manner as and for the purpose herein described.

43,781.—Horse-halter.—Enoch H. Le Baron, Mattapoisett, Mass.:

I claim a rope halter made by "unlaying" the strands of a part of the rope, and plaiting or braiding up that portion which forms the "headstall," and splicing it together, in the manner substantially as described.

43,782.—Corn Planter.—Fredrich Loos, Denver City, Territory of Colorado:

I claim the cylinder, E, its recess, e, piston, f, spindle, h, and the projection, j, the whole being arranged within the packed box, B, in respect to the hopper, c, and tube, D, substantially as and for the purpose herein set forth.

43,783.—Apparatus for cutting-out Knitted Stockings.—Wm. Martin, Philadelphia, Pa.:

I claim the arrangement described of knives with straight cutting edges, B B, and zig-zag cutting edges, a and a', for the purpose specified.

43,784.—Boot and Shoe.—Charles Mayer, New York City. Ante-dated June 3, 1864:

I claim the employment of the pin, c, and hinges, a, in combination with boots and shoes, substantially in the manner and for the purpose herein shown and described.

[This invention relates particularly to an improvement in laced shoes or "balmoral" boots, and the principal object of the invention is to enable the wearer to take off said boots or shoes without unlacing them, simply by withdrawing a pin. Furthermore, by the application of this improvement to boots or shoes the ankle of the foot is braced or supported, and the wrinkling and creasing of those parts contiguous to the back seam of such boots or shoes is prevented.]

43,785.—Manufacture of Table Cutlery.—Alex. McGuire, Winsted, Conn.:

I claim forming a "nib-bolster" for table cutlery by the "drop" process, substantially as and for the purposes described.

43,786.—Flat-iron Heater.—George R. Moore, Lyons, Iowa:

I claim, first, The arrangement of a sad-iron heater having an outer casing, D, surrounding an annular chamber, a, between it and the fire-chamber, B, upon which rests the griddle, E, substantially as described and for the purposes set forth.

Second, I also claim the rim or flange, h, of the casing D, extending above the griddle, E, for the purpose of protection against cold currents of air.

43,787.—Tanning Apparatus.—Joseph Mouren, Marseilles, France:

I claim, first, The method of tanning hides or skins by placing them in a vessel each between two layers of tan before injecting the tanning liquid, substantially as described.

Second, The construction of the tanning vessel, that is to say, making the same of cast-iron and of a columnar form lined with lead, substantially as set forth.

43,788.—Umbrella.—Francis V. Noette, Brooklyn, N. Y.:

I claim in the construction of umbrellas and analogous folding structures, the employment of metal sockets, D and E, formed from tubes as described, and adapted to confine and release the folding parts of the framework, substantially in the manner and for the purpose herein set forth.

43,789.—Lumber Measure.—A. M. Olds, Chicago, Ill.:

I claim, first, The expansible wheel, B, provided with the adjustable disk, C, or its equivalent, operating substantially as and for the purposes herein set forth and shown.

Second, I claim the combination of the disk, C, the shaft, J, and bent rod, d, arranged and operating substantially as and for the purpose specified.

Third, I claim the combination of the expansible wheel, B, and the worm, D, with the system of wheels, E F G H I, or their equivalents, substantially as and for the purposes herein delineated and set forth.

43,790.—Fence Post.—Jerome Palmer, Painesville, Ohio:

I claim the manner of combining a wood or other post with an anti-destructible base by constructing the upper portion of the base or sill, A, with the broad and elongated wedge-shaped tongue, C, the said tongue being provided with a notch or its equivalent on its upper edge, and bolt holes through its lower part, as shown, in combination with a wood post having faces, or an open aperture, c, corresponding to the faces of the said tongue, C, and provided with the bolts, b and a, for ensuring the post against splitting, and securing it to the said tongue, and located as shown, or iron posts with such corresponding faces or planes, as shown in Fig. 6, substadtially as herein stated and for the purpose specified.

43,791.—Dough-kneader.—A. Judson Palmer, Brooklyn, N. Y.:

I claim the conical hopper, A, in combination with the stirrer or kneading bar, B, arranged within the hopper, to operate substantially as and for the purpose herein set forth.

43,792.—Clasp for Bank Bills, etc.—Charles Perley, New York City:

I claim a metallic spring clasp or file for bank bills, etc., held together in substantially the manner described and shown.

43,793.—Hawse Pipe-stopper.—Charles Perley, New York City:

I claim a divided stopper adapted to receive the cable, and fitting into the pipe passing said cable, substantially as specified.

43,794.—Damper.—Hyland Raymond, Racine, Wis.:

I claim the annular plate, E, in combination with the plate, C, of less diameter than the drum, A, the two plates being arranged within the drum, and one of them being movable, to operate in the manner substantially as herein set forth.

[This invention relates to a new and improved heat radiator, designed to be applied to the pipes of stoves, furnaces, and the like, to prevent the heat from passing into the flue or being carried off by the pipe, and cause it to be radiated into the room.]

43,795.—Machine for cutting Rasps.—Alexander N. Redman, Boston, Mass. Ante-dated July 23, 1864.

I claim first, The arrangement of mechanical devices herein described for forming rasps, the whole operating together substantially as described.

Second, Imparting to the rasping tool employed, the necessary up and down movements to form the rasp, by means of the arm-wheel, g, lever-frame k, and horizontal lever-arm, q, arranged and operating together as specified.

Third, The combination of the cam-groove, s, horizontal shaft or fulcrum, r, and lever, g, arranged and operating together as herein above set forth, across the blank bar while it is fed along to the said tool at regular and proper intervals of time.

43,796.—Lithographic Power Press.—Edward Reynolds, Mansfield, Conn.:

I claim regulating the throw of the scraper by means of the set screw m, and the adjusting slot, l,2 as described.

I also claim the employment of a distributing cylinder and ink rollers, a b c, when having regular lateral movements imparted to them, substantially as and for the purpose set forth.

I also claim giving to the front roll, c, a forward movement above and out of contact with the stone, and a back movement upon the stone, substantially as specified.

I also claim giving to to the roll, c, and to the damper, their vertical movements, by the sliding incline plate as set forth.

I also claim the method of operating the carriages, S and W, by one oscillating plate, h, (or one on each side of the machine) actuating the two levers, substantially as set forth.

I also claim in a machine organized with a stationary bed, reciprocating rolls, damper and scraper, and a vibrating tympan, working the roller and damper carriage, and the tympan and scraper carriage alternately, the mechanism on one side of the stone being stationary, while that upon the opposite side is operating.

I also claim the manner of interruping or throwing out of action the tympan and screper, substantially as shown

I also claim the mechanism for operating the nipper fingers, closing them upon the sheet when the tympan begins to move and opening them and releasing the sheet when the tympan returns to its normal position substantially as set forth.

I also claim actuating the tympan by the scraper curved arm, v, and projection, u, operating substantially as set forth.

I also claim adjusting the stone by means of a series of elevating screw shafts, geered to and operating by a center screw shaft, substantially as described.

I also claim the combined employment of the tympan and nippers for the double purpose of carrying the sheet to the stone, and back therefrom to its first position.

43,797.—Churn.—George W. Sayre, Pisgah, Ohio:

I claim the arrangement of the double rebated central upright, D, provided with the clasps, a b, and slides, E E, furnished with adjusting pins for the dashers, when operated together in the manner described for the purpose set forth.

43,798.—Soda Fountain.—Carl Schultz and Thomas Warker, New York City. Ante-dated July 28, 1864.

We claim first, Surrounding the soda fountain, A, with an atmosphere of a pressure equal to that of the gas contained in the said fountain, substantially in the manner and for the purpose described.

Second, The inlet and outlet valves, d d', in combination with the vessel, A, and shell, D, constructen and operating in the manner and for the purpose substantially as specified.

43,799.—Hoop Toy.—Reuben Shaler, Madison, Conn.:

I claim the combination of a spring or its equivalent with hoop toys, when arranged so as to give to the toy a tilting motion from the revolving hoop substantially as specified.

43,800.—Soap.—Charles E. Salisbee, Detroit Mich.:

I claim the producing of soap in the form of a fine dry powder, with powers of cleansing as aforefaid, using for that purpose the aforesaid ingredients, or any others substantially the same, and which will produce the same effect.

43,801.—Igniting Fuses for Shells.—Charles W. Smith, Evans, N. Y. Ante-dated February 1, 1864.

I claim a portable fuse primer adapted to be transported separately and to be attached at the end of a time fuse just previous to the insertion of the shell in the gun for the purpose of igniting the fuse at the moment of discharge.

43,802.—Grinding Mill.—William H. Starry, Franklin, Ohio. Ante-dated February 28, 1864.

I claim the mode substantially as described of automatically arresting the motion of a grinding mill when running empty by means of the disengaging mechanism, C D E e m N O Q, or devices substantially equivalent.

43,803.—Combined Air and Steam Engine.—O. M. Stillman, Westerly, R. I.

First, I claim in an engine operating with the aid of the pressure in the furnace relieving such engine of resistance by maintaining the steam in the steam generator, B, at a pressure much higher than that in the furnace through the nozzle, G3, or its equivalent so as to perform the triple functions, substantially in the manner and for the purpose set forth.

Second, I claim in combination with an engine operating by the pressure in the furnace, A, the steam generator, B, steam blast, F3, and air induction, H', arranged relatively to the furnace, A, and to each other, substantially as and for the purposes herein set forth.

Third, I claim in such engines regulating the temperature of the gaseous matter passing to the working cylinder by means of the valve, f, arranged relatively to the passages, F F' F2 F3, or their equivalents, substantially in the manner and for the purpose herein set forth.

43,804.—Gang Plow and Seeder.—Draper Stone, Pittsfield, N. Y.:

I claim the combination and relative arrangement of the draught beam, A, diagonal plough beam, B, ribbed joint plate C, tie bolt, t, (one end of which is connected to the ear, e, of the washer plate, w'') with the seed box, B, and its appurtenances, all being arranged and operating conjointly in the manner and for the purposes set forth,

43,805.—Apparatus for rectifying Alcohol.—Macklot Thompson, St. Louis, Mo.:

I claim First, The employment in rectifying stills or apparatus of columns composed of diagram sections in combination with inverted cups having horizontal flanges at their borders substantially in the manner and for the purposes set for h.

Second, The employment in rectifying stills or apparatus of columns composed of diagram sections in combination with projecting overflow pipes whose orifice is enlarged or funnel shaped, substantially in the manner and for the purposes described.

Third, The employment in rectifying stills or apparatus of columns composed of diagram sections provided with flanged inverted cups in combination with funnel-shaped overflow pipes, substantially in the manner and for the purposes described.

43,806.—Lock.—Charles B. Toll, Boston, Mass.:

I claim my improved lock hereinbefore described as having the series of rotary tumblers, stationary, divisional and recessed plates, and friction springs made and arranged together and applied to a box or case, substantially in manner and so as to operate and be operated by a key as described.

43,807.—Shoulder Brace.—Albert W. Upton, Lowell, Mass.:

I claim the combination and arrangement of the auxiliary brace straps F F, with the shoulder straps A A, and the arm straps, B B, the said shoulder straps being connected by a strap, C, and provided with means (viz. suspension straps, D D E E, or their equivalents) by whi ch the brace may be connected with the pantaloons or a body belt.

43,808.—Tilling the Soil.—W. Wadsworth, California, Cal.:

I claim the employment or use of a series of tines or teeth, d, attached to a suitable rockshaft, D, and having an oblique or inclined position relatively with the surface of the soil to be operated upon so that as said teeth or tines are propelled or drawn along in the soil, the latter will be forked up while weeds, straw and similar trash will pass over the teeth or tines to the rear of the machine substantially as herein set forth.

I further claim the combination of the teeth or tines, d, rotary toothed drum, G, and roller, C, all arranged substantially as and for the purpose specified.

[This invention relates to a new and improved machine for forking up and pulverizing the soil to a requisite depth.]

43,809.—Shears.—Theodore Wallis, Scipo, N. Y.:

I claim the pulley, I, and the connections, G and H, in combination with the levers C and B, as set forth.

43,810.—Radiators.—William Washburn, Boston, Mass.:

I claim in combination the chamber, A, tubes, C C, &c., and the passages, B B with the openings, G G, substantially as herein described.

43,811.—Straw-cutter.—D. H. Whitlemore, Worcester, Mass.:

I claim, first, The lever, b, ears, c d, convex surface, e, with the corresponding concave of d, when combined and arranged as and for the purpose specified.

Second, I claim the inclined plane of the step, h, when combined with the corresponding shape of c, and used as and for the purpose set forth.

43,812.—Hemp and Flax Brake.—John Bryant (assignor to himself and Allen L. Baily), Akron, Ind.:

I claim the walking beam, F, connected to the bar or rod, E, which is attached to the vibrating jaw, C, of the brake, through the medium of the zig-zag bar, E', and spring, G, arranged and applied substantially as and for the purpose herein set forth.

[This invention relates to a new and useful improvement in the ordinary flax and hemp brake, and it consists in a novel manner of operating the same from a rotary driving shaft, whereby the machine may be operated by any convenient motor, and the brake prevented from being injured or strained in the event of the movable jaw being impeded by tough flax or hemp or other substance between it and the stationary jaw.]

43,813.—Process of hardening Iron.—Thomas Chappell & Wm. Ashley Jones, Winona, Minn.:

We claim the within described process of hardening iron or other metal by bringing the article to be hardened, when heated to a white heat in contact with a piece of old cast-iron kettle, or other similar cast-iron heated to a melting heat, and then cooling suddenly, substantially as herein specified.

[This invention is based on the discovery that by heating a piece of iron or steel to a white heat, and at the same time heating a piece of cast-iron of that kind which is used for kettles or other vessels to a melting heat, and then quickly rubbing the two together or by dipping the heated iron, steel or other metal in cast-iron of the class above described, melted in a crucible, for a short period of time, the two will so blend that by at once cooling the same in water it will become so hard that no file will touch it.]

43,814.—Device for tapping Boots and Shoes.—Gurdon Conkling (assignor to Caroline A. Conkling), Conklingsville, N. Y.:

I claim the employment or use of the sole plate, A, in combination with a last-shaped piece, B, and wedge, C, all constructed and applied in the manner and for the purpose substantially as specified.

[This invention consists in the employment or use of sole plate made of metal or other suitable material and provided with a projecting toe flange in combination with a piece of board cut out according to the outlines of last and with a wedge, in such manner that by means of said last-shaped board and wedge the sole plate are firmly secured on the inside of a boot or shoe, and a new half-sole can be put on without the necessity of having a full last corresponding to the boot or shoe to be soled, and so that any person, particularly soldiers in the field, will be enabled to provide themselves with the necessary means for the purpose of tapping their own boots or shoes.]

43,815.—Stove Cover of Cooking Stoves.—George Himrod & C. G. Moulton (assignors to said George Himrod), Chicago, Ill.:

We claim the combination of the cover, B, provided with the convex perimeter as shown, with the concave bed of the boiler hole, C, arranged and operating as and for the purposes herein specified and shown.

43,816.—Eyeletting Machine.—Timothy K. Reed, North Bridgewater, Mass., assignor to Elmer Townsend, Boston, Mass.:

I claim in connection with an inclined chute and hopper, constructing the hopper with eyelet passages leading from the side thereof when said passages are so arranged as to direct and convey the eyelets immediately into the chute, substantially as described.

I also claim operating the vibrating chute and the lower set simultaneously by the lever, g, or its equivalent, substantially as set forth.

I also claim causing the pin, o, to withdraw during the descent of the lower set and enter the lower eyelet in the chute, as said eyelet comes over the set, substantially as set forth.

I also claim the combination of the lifter bar, g, spring, s, and rod, r, operating in the manner described, for effecting the movements of the pin, o.

43,817.—Grain Separator.—Otis W. Stanford (assignor to himself and Robert W. Gilchrist), Lebanon, Ohio:

I claim, first, The arrangement of the shoe, B, suspended near mid hight, at its rear end in the open sided frame or casing, A, by means of the yielding side straps or bars, L, and poised in front upon the single pallet, F p p', whose arms act to strike the shoe when the latter is laterally agitated by the zig-zag, cam, N, or its equivalent, substantially as set forth.

Second, The arrangement immediately beneath the discharging aperture of the hopper, of the chute, G, from which a series of figures, H, project above the upper surface of the chute and rearward beyond its edge, for the purposes set forth.

Third, The arrangement of grass seed screen, I, double inclined chute, J, and side ducts, K K', substantially as set forth.

Fourth, The provision of the spring bar or catch, T, for the secure holding and ready liberation of one or more screens, as set forth.

43,818.—Power Press.—Moses G. Wilder, Meriden, Conn., assignor to himself and H. B. Bigelow, New Haven, Conn.:

I claim, first, The combination of the latch bolt with an eccentric wrist and roll, when arranged to catch and release the roll, as and for the purpose specified.

Second, The adjustable friction plate described in combination with the eccentric roll and wrist, for the purpose specified.

43,819.—Sewing Machine.—Charles H. Wilcox (assignor to James Wilcox), New York City. Patented in England May 31, 1862:

I claim the combination of devices for producing in sewing machines a self-acting intermittent tension of the needle thread, by holding such thread rigidly between suitable nipping surfaces until the stitch or loop is nearly or quite drawn up to the surface of the material being sewed, and then releasing the thread suddenly, so as to allow sufficient thread to be drawn through the apparatus with little or no tension or friction for the forming of the next stitch, substantially in the manner herein set forth.

43,820.—Breech-loading Fire-arm.—Alfred Krupp, Essen, Prussia:

I claim, first, The valve, F, and screw, D, in combination with the transversely sliding breech-block, B, constructed and operating in the manner and for the purpose, substantially as herein specified.

Second, The notched socket, m, in the breech-block, in combination with the expansion washer, G, constructed and operating substantially as and for the purpose set forth.

43,821.—Photo-galvanography.—Paul Emiele Placet, Paris, France:

I claim the method of producing engraved surfaces by employment and application of substances which light renders insoluble to and upon the side of the subjectile which is directly exposed to the light in combination with the dissolving operations and the production of reliefs or plates engraved in intaglio, by molding or galvanoplasty, substantially as herein described.

43,822.—Photo-sculpture.—Francois Willieme, Paris, France:

I claim the process by means of which I obtain sculpture of any desired size, from a living or inert subject, said process consisting in the application of photography under certain conditions, in combination with one or several pantagraphs or equivalent apparatus, and of a platform for carrying the subject which is divided into as many parts as there are views of the subject, model, or object to be photo-sculptured; this platform being capable of assuming all the positions corresponding to those of the views of the subject.

RE-ISSUES.

1,735.—Lamp.—Cahoon Manufacturing Company (assignees by mesne-assignments of Charles W. Cahoon), Portland, Maine. Patented Feb. 19, 1861:

I claim the combination of the chimney-holder and clamp chimney fastenings of a lamp with the support of the chimney-holder by a horizontal joint; the combination as a whole operating substantially as set forth.

I also claim the combination of the chimney-holder, chimney fastenings, support for the chimney, joint, and thumb plate; the whole operating substantially as set forth.

I also claim the combination of the preceding combination with a guard, arranged substantially as set forth.

I also claim the combination of a spring with the chimney-holder, chimney fastenings, support for the chimney and joint, the whole operating substantially as set forth.

I also claim the combination of a chimney guard with the chimney-holder, chimney fastenings, support for the chimney and joint, the whole operating substantially as set forth.

I also claim the combination of a transparent plate with an opaque metal lamp body, substantially as set forth.

1,736.—Stirrup.—Cyrus W. Saladee, Paducah, Ky. Patented April 27, 1864:

I claim as a new article of manufacture the guard, B, constructed, operating, and attached in the manner substantially as shown and described.

EXTENSION.

Bolt and Rivet Machine.—Wm. E. Ward, Rochester, N. Y. Patented July 30, 1850:

I claim, first, Gaging the length of the shank after a head has been formed on the end by pushing the head against a gage beyond the header which has a lateral motion to allow it to pass by, substantially as described, in combination with the operation of cutting off the shank at such distance from the griping dies as by the same operation to determine or gage the length of rod or wire which shall be left projecting beyond the griping dies for forming the next head, substantially as described.

Second, Cutting off the rod or wire, after the head has been formed, by the return lateral motion of the header, in combination with the rest, substantially as described, the edges of the rest and heading die being formed to answer the purpose of shears, as herein described.

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Notes and Queries

G. T. H., of Ohio.—To bronze cast-iron, clean it thoroughly and dip it into a solution of sulphate of copper. The sulphate of copper is dissolved in water. Your best course probably is to buy bronzing powder of the dealers in paint.

P. S., of N. Y.—Ice formed by rapid evaporation of water will melt with just the same rapidity as other ice. The length of time that it will last depends entirely upon the conditions in which it is placed.

C. P. of N. Y.—We know of no better way to destroy the luster of your shellac varnish than to rub it with coarse sandpaper, or else to paint it over.

T. M. D., of U. S. N.—You will find a description of the Hecker & Waterman engine in the last number of the SCIENTIFIC AMERICAN. We have published the relations of temperature to pressure as ascertained by Regnault, in a table arranged in the form of a thermometer scale, which showed the relations very plainly. We also gave a full history at the time they were made of the experiments of Fairbairn and Tate, with an illustration of the apparatus, and tables of the results. In regard to the books, we criticise all that are sent to us, giving our candid opinion whatever it may be. We should be pleased to hear from you again.

R. F., of Ind.—In a condensing engine, when the steam is condensed it is impossible to condense it all, hence the back pressure. As the pressure is removed from the water in the condenser, the water evaporates, and if the pressure could be entirely removed the water would all pass into vapor at any temperature; so say the highest authorities.

T. B. G., of S. C.—"King's Notes on the Steam Engine," is the book you require. Address D. Appleton & Co., New York,

W. G. B., of Mo.—You ask, "suppose I take two tubes, each 4 feet 6 inches high and one inch caliber at the lower end, and have one 6 inches in diameter at the upper end, and the other one inch; if filled with water will the water pass out of one with more force than out of the other?" There is more in this problem than might at first appear. The friction of the water against the sides of the tube would be greater in the smaller tube, but there might be a contraction of the vein in the larger tube that would more than counterbalance this. We should not be able to give an answer without trying the experiment. Rosin is obtained from the pitch of common pine by expelling the spirits of turpentine by heat.

A Farmer of Ind.—By a coincidence the article on auother page in reference to the sugar beet was in type when your letter came to hand. We intend to publish a full description of the process of making sugar from the beet, sometime before you can raise a crop.

W. S. W., of Mass.—Benzine will remove paint and grease from clothing. Soap is made by boiling any kind of grease in a solution of any alkali.

R. G. H., of Cuba.—To find the contents of your cylinder multiply the area of the bore by the hight of the cylinder the product is the solid contents.

J. W. L., of Minn.—Boxwood has the greatest cohesive strength of any known wood. According to the experiments of Messrs. Renine, Barlow & Telford, it has a cohesive strength of 20,000 pounds avoirdupois per square inch; it is therefore stronger than cast-iron which has a cohesive strength of only 18,636 pounds per square inch.

P. W. McG., of R. I.—The size for drills to be used in holes that are to be tapped are obtained by a thin legged pair of calipers. Measure to the bottom of the thread and make the drill that size, it should not be a full thread in cast-iron, but three-fourths, for it is such a crystalline metal that the sharp edge breaks off when the thread is too full.

Waterville, Me.—The process of bread making you allude to requires ordinary yeast and water. Milk makes no difference in raising bread, but makes it of a better flavor.

P. W. A., of Ohio.—Very many ways are recommended for preserving eggs, such as varnishing the shell, greasing it, steeping in a weak solution of vinegar, etc., but we think that eggs in lime keep better than other plans. Slack the lime and put some in the bottom of a jar, then put the eggs in and strew lime over them; continue putting alternate layers of lime and eggs until the jar is full. Eggs put down this way will keep good until spring, but they will have a limed flavor towards the last.

H. P. G., of Pa.—"King's Notes on the Steam Engine," is a work that we can always recommend as being practical, sensible, and generally up to the latest styles. Mr. King or some other competent person who has time, might go to work and collect examples of modern valves and valve-gearing, engine connections, such as the front link, cross-head and slides of American beam engines, screw engines, etc., with good results.

C. M., of Wis.—The velocity your ball will acquire in falling can be found by multiplying the distance it falls in feet by 64'33, the square root of the product will be the velocity in feet per second

C. M. F., of Conn.—Slide valve seats are not ground with emery as they were in old times, they are scraped. This takes more time but makes better work.

I. J., of N. H.—It is perfectly practicable for you to obtain a situation as an apprentice in the drawing room of a large workshop. We should think that your town would be a good place to commence. If, however, you know any one in the large cities, New York, Boston, or Philadelphia, who can make interest for you you will find it an advantage.

W. A. C., of Wis.—Many queer questions are submitted to us. Here is one of the latest. "If two persons with constitutions equally healthful sleep in a room without ventilation, one near the ceiling and the other near the floor, which one would be affected by impure air first, and if they should remain until death ensued which would die first?" Carbonic acid gas, a deadly poison—much heavier than common air—is exhaled from the lungs, and in an apartment falls to the floor. In a small tight sleeping room an individual resting near the floor would be overcome with the poison sooner than if near the ceiling.

W. S., of Pa.—For the best work on dyeing address Henry Carey Baird, 506 Walnut street, Philadelphia.

J. B. B., of N. Y.—You can turn your grindstone best with a piece of an old square file. You cannot harden steel so that it will not wear in turning a grindstone. The file corner should be used, and when it is worn break the end off and try it again. Run the stone moderately fast.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Aug. 3, 1864, to Wednesday, Aug. 10, 1864:—

S. W. P., of Ill., $25; J. A. M., of Conn., $25; J. N. B. J., of Mass., $25; D. W., of Pa., $25; C. H. S., of Pa., $25; J. F. B., of Ind., $25; W. W. P., of Ill., $25; G. H. S., of Pa., $50; J. H. G., of Iowa, $36; H. B. S., of Wis., $30; S. C. R., of Maine, $25; H. G. W., of Iowa, $16; J. S., of Ohio, $16; W. W. H., of Cal., $10; J. J. G., of Ohio, $10; H. W. H., of Conn., $15; T. & W., of Pa., $25; C. P. H., of Wis., $25; A. C., of Iowa, $16; S. R., of Mo., $16; J. G. F., of Mass., $40; B. W. McC., of Iowa, $16; J. F. C., of ——, $15; R. McG., of N. J., $10; W. A. G., of N. Y., $40; S. S. H., of Maine, $30; C. C. S., of N. Y., $30; A. W., of N. J., $20; W. & J., of N. H., $45; I. L. H., of Mass., $20; A. D., of N. Y., $20; P. M., of N. Y., $35; T. R., of Mo., $20; J. L., of Iowa, $20; C. G. B., of R. I., $56; T. R., of Chili, $20; J. J., of N. Y., $15; J. H. P., of N. Y., $15; W. N. S., of Ill., $20; C. H. W., of N. Y., $20; J. O., of N. Y., $15; G. T. T., of N. Y., $45; C. M., of N. Y., $20; S. C. B., of N. Y., $20; H. E. P., of N. Y., $20; S. S. J., of Ohio, 20; G. F. J. C., of N. J., $41; J. G. F., of Mass., $15; T. R. F., of Mich., $20; H. S., of N. Y., $16; A. J. A., of Ill., $20; A. O. D., of Conn., $40; R. A., of Maine, $16; C. C. D., of Pa., $61; E. O. W., of N. Y., $41.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Aug. 3, 1864, to Wednesday, Aug. 10, 1864:—

R. W. & D. D., of N. Y.; J. F., Jr., of N. Y.; W. J., of N. Y.; H. M. S., of N. Y.; T. S., of N. Y.; C. S., of N. Y.; H. Z., of N. Y.; G. C. B., of Ill.; S. C. B., of N. Y.; C. G. B., of R. I.; C. C. B., of Iowa; J. F. B., of Ind.; C. P. H., of Wis.; D. W., of Pa.; T. & W., of Pa.; J. W., of Ohio; C. H. S., of Pa.; S. C. R., of Maine; W. W. P., of Ill.; N. T., of N. H.; S. W. P., of Ill.; J. A. M., of Conn.; J. W. M., of N. Y., (2 cases); J. N. B. J., of Mass.; J. C., of Ohio; J. H. W., of Ohio; C. C. B., of Iowa; E. C. G. (2 cases), British Colony; J. H. G., of Iowa; B. W. McC., of Iowa.

TO OUR READERS.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their unds.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

STATE OF NEW YORK, COMMISSARY GENERAL'S DEPARTMENT,
New York, August 9th, 1864.

PURSUANT TO AN ACT OF THE LEGISLATURE of the State of New York, passed April 25th, 1864, Proposals for the rebuilding, alteration, repairing, and reconstruction of the "Brooklyn Arsenal," situated in the City of Brooklyn, N. Y., indorsed "Proposals for the alteration, repairing, and reconstruction of the Brooklyn Arsenal," will be received at the office of the undersigned, corner of 35th street and 7th avenue, in the City of New York, until the 12th day of September next.

Plans and specifications are ready for examination at the above office, and the bids must be for the whole work. The right to reject any and all proposals is expressly reserved, and no contract entered into shall be binding on the State until the same shall have been approved by the Commissioners named in said act.

Good and sufficient surety will be required from the party or parties to whom said contract shall be awarded, to be approved by a majority of said Commissioners.

All proposals received will be opened at the office of the Hon. Lucius Robinson, Comptroller, in the City of Albany, on the 19th day of September next, at 12 M. JAMES A. FARRELL,
Commissary General of Ordnance, S. N. Y.
7 4

TO MINERS AND MINERAL WORKERS.—THE Boston Milling and Manufacturing Company, have erected steam mills and crushers at East Boston, are now ready to execute contracts for crushing and powdering quartz and other ores, of whatever nature, by the ton or by the thousand tons. They will shortly be prepared, upon the completion of their desulphurizing and smelting furnaces, now in process of erection, to contract for roasting, amalgamating, and refining the precious metals, gold, silver, copper, tin, etc. Being now the sole owners of Whelpley & Storer's several patents for the treatment of minerals, and for the powdering of all hard substances, as bone, coal, fire clay, plaster, fossil shells, emery, flint, feldspar, manganese, drugs, dye stuffs, etc., they offer for sale Patent Rights, and machinery for use.
SAMUEL STORER, Treasurer, 15 Merchants Row, Boston.
8 4

PATENT PORTABLE MOSQUITO NET OR INSECT Protector, weighs but 2 ounces, and can be carried in the pocket. It was illustrated in the SCIENTIFIC AMERICAN, July 23d, 1864. Sent anywhere in the United States, free of postage, for 75 cents each, or $9 a dozen. Address JOHN ZENGELER. Post-office Box 2,682, Chicago, Ill. 8 2*

YANKEE KNIFE-CLEANERS.—NOTWITHSTANDING the increased cost of everything I can still sell my machines at the same price, 25 cents each. Dealers at a distance had better order one dozen at $1 60, instead of one for sample, as it costs nearly a dollar to send one machine west of Detroit. Address EGBERT P. WATSON, Box 773, New York Post-office.

J. A. FAY & CO., CINCINNATI, OHIO,
MANUFACTURERS OF
PATENT WOOD-WORKING MACHINERY,
PARTICULARLY DESIGNED FOR
RAILROAD AND CAR SHOPS.
ALSO, FOR
PLANING MILLS,
Sash and Blind, Cabinet, Box Wheel, Felloe and Spoke, Stave and Barrel Manufactories, Agricultural Implement Makers, &c.
Warranted superior to any in use. Illustrated Catalogues furnished on application. 8 12

MILL STONE DRESSING DIAMONDS SET IN Patent Protector and Guide. For sale by JOHN DICKINSON, Patentee and Sole Manufacturer and Importer of Diamonds for all Mechanical purposes. Also, Manufacturer of Glazier's Diamonds, No. 64 Nassau street, New York City. Old Diamonds reset.
N. B.—Send Postage stamp for Descriptive Circular of the Diamond Dresser 8 2*

PROPOSALS FOR HORSE EQUIPMENTS.

ORDNANCE OFFICE,
WAR DEPARTMENT,
WASHINGTON, D. C., July 28, 1864.

Proposals will be received by this department until Friday, Aug. 12th, 1864, at 4 P. M., for the delivery at the following arsenals of Horse Equipments, United States cavalry pattern, as hereinafter stated:—

At the New York Arsenal, 10,000.
At the Frankfort Arsenal, 6,000.
At the Alleghany Arsenal, 6,000.
At the St. Louis Arsenal, 3,000.

These sets of horse equipments are to be furnished complete, with the exception of horse brush, curry-comb, lariat, picket pin, link, nose bags, spurs, and straps, blankets, watering bridle, and sweat leather. The curb bits and stirrups are to conform strictly in pattern and finish to those deposited at the above-named arsenals. The malleable iron trimmings are to be japanned. The trees are to be of the regulation pattern, assorted sizes, not less than 3½ inches between the bars on the inside of the pommel; the side bars of hard white wood or beech; the pommel and cantles of beech, well put together. All the irons are to be one-tenth of an inch thick, and all let into the wood, to be covered with the best slaughtered cow hide. All other coverings will be rejected. The halters are to be riveted with twelve No. 12 copper rivets, as shown in samples. The bridle rein is to be seven-eighths of an inch wide, and made as per sample. The girth strapping to be riveted. The two D rings to have a stop; two rivets in each end of the girth; no cross sewing; and all the stitching throughout the sets will not be less than eight stitches to the inch. The stirrup hoods will be omitted. The carbine socket strap is to be riveted with two No. 12 copper rivets. The trees are to be subject to inspection during all stages of their manufacture, and, if deemed necessary, the leather to be used in the fabrication of these equipments to be inspected before cutting.

The final inspection will be made at the arsenal where delivered.

Deliveries must be made at the rate of not less one-tenth per week of the whole amount contracted for, the first delivery to be made on the ——

Failures to make deliveries at a specified time will subject the contractor to a forfeiture of the number he may fail to deliver at that time.

No bids will be considered from parties other than regular founders, or proprietors of works who are known by this Department to be capable of executing in their own shops the work proposed for.

Bidders will state explicitly the Arsenal at which they propose to deliver, and the number of sets they propose to deliver at each place, if for more than one.

Forms of bids can be obtained at the above-named Arsenals, or at this office. Proposals not made out on this form will not be considered.

GUARANTY.

The bidder will be required to accompany his proposition with a guaranty signed by two responsible persons, that, in case the bid is accepted, he will at once execute the contract for the same, with good and sufficient sureties, in a sum equal to the amount of the contract, to deliver the article proposed, in conformity with the terms of this advertisement; and in case the said bidder should fail to enter into the contract, they to make good the difference between the offer of said bidder and the next responsible bidder, or the person to whom the contract may be awarded.

The responsibility of the guarantors must be shown by the official certificate of the Clerk of the nearest District Court, or of the United States District Attorney.

Bonds in the sum equal to the amount of the contract, signed by the contractor and both of his guarantors, will be required of the successful bidder or bidders upon signing the contract.

FORM OF GUARANTY.

We, the undersigned, residents of ————, in the county of ————, and State of ————, hereby jointly and severally covenant with the United States and guarantee, in case the foregoing bid of ———— be accepted, that he or they will at once execute the contract for the same, with good and sufficient sureties, in a sum equal to the amount of the contract, to furnish the articles proposed in conformity with the terms of this advertisement, dated July 28, 1864, under which the bid was made; and, in case the said ———— shall fail to enter into a contract as aforesaid, we guarantee to make good the difference between the offer of the said —— and the next lowest responsible bidder, or the person to whom the contract may be awarded.

Witness: } Given under our hands and seals this —— day of ——, 186—.
[Seal.]
[Seal.]

Proposals will be addressed to "Brigadier-General George D. Ramsay, Chief of Ordnance, Washington, D. C.," and endorsed "Proposals for Horse Equipments."
GEORGE D. RAMSAY,
2 Brigadier-General, Chief of Ordnance.

THE CHEAPEST MODE OF INTRODUCING INVENTIONS.

INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of a reasonable charge for the engraving.

No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no second-hand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

For further particulars address—

MUNN & CO.,
Publishers of the SCIENTIFIC AMERICAN,
No. 37 Park Row, New York City.

CIGAR LIGHTERS.—A VALUABLE INVENTION has been made by H. REIMAN, of this city, in making Cigar Lighters that will answer all the requirements of smokers, and thus become a profitable article of manufacture. These matches possess none of those objectionable features which all others do. They can be made cheap enough for every body. They do not burn with smelling fumes so objectionable to cigar-smokers, but are quickly transformed into a burning coal, retaining heat enough to light two cigars or pipes. They are kept in a metallic box, made by the inventor on purpose to light cigars easily and without burning the fingers. The following calculations will show to manufacturers the value of these matches. Assuming the number of smokers in the loyal States only to be four millions, the daily consumption of these matches would certainly be ten millions. Allowing one-half cent net profit per box, containing one hundred matches, the amount would be $500 per day, or $182,500 per year, and in 17 years $3,102,500. The inventor intends to sell his patent right in parts or whole. For further information address A. F. SCHLEGEL at the SCIENTIFIC AMERICAN Office, 37 Park Row, New York. 7 2*

RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y. The Forty-first Annual Session of this well-known School of Engineering and Natural Science, will commence Sept. 14th, 1864. The Principal Building is completed and ready for occupation. The New Annual Register, giving full information, may be obtained at Appleton's Bookstore, New York, or from Prof. CHARLES DROWNE, Director, Troy, N. Y. 6 8*

CAVALRY HORSES WANTED.

CAVALRY BUREAU, OFFICE OF ASSIST. QUARTERMASTER,
No. 18 State street, New York, June 10, 1864.

I WILL PURCHASE IN OPEN MARKET ALL THE Calvary Horses that may be presented and pass inspection at the Government Stables, corner of 10th avenue and 25th street, in this city, until further notice.

Payment will be made in checks payable in certificates of indebtedness, when seven (7) or more horses are received. Price, one hundred and sixty dollars each.
6 tf GEO. A. BROWNING, Capt. and Assist. Qr. Mr.

INCRUSTATION.—EIGHT YEARS' USE OF THE "Anti-Incrustation Powder" stamps it a standard article, effective and safe in its operations.
6 6* H. N. WINANS, 11 Wall street, New York.

TWIST DRILLS.—ALL SIZES OF STUB'S WIRE Drills; also Twist Drills for machinists' use, varying in diameter by 32nds from ⅜-inch to 1½-inch, together with sockets to fit them. For sale by the "Manhattan Fire Arms Company," corner of High and Orange streets, Newark, N. J. 5 4*

NEW APPARATUS FOR MAKING NITROUS OXIDE chemically pure. Needs no watching, and breaks no glass. Pure Nitrate Ammonia, yielding eight gallons per lb. more than the ordinary. Rare Chemicals and Apparatus for experimenters. A. W. SPRAGUE, 89 Washington street, Boston. 5 4*

GROVER & BAKER'S HIGHEST PREMIUM ELASTIC Stitch Sewing Machines, 495 Broadway, New York.
1 tf

OIL! OIL! OIL!
For Railroads, Steamers, and for machinery and Burning, PEASE'S Improved Engine and Signal Oil, indorsed and recommended by the highest authority in the United States. This Oil possesses qualities vitally essential for lubricating and burning, and found in no other oil. It is offered to the public upon the most reliable, thorough, and practical test. Our most skillful engineers and machinists pronounce it superior to and cheaper than any other, and the only oil that is in all cases reliable and will not gum. The "Scientific American," after several tests, pronounces it "superior to any other they have used for machinery." For sale only by the Inventor and Manufacturer, F. S. PEASE, No. 61 Main street, Buffalo, N. Y.
N. B.—Reliable orders filled for any part of the United States and Canada. 4 tf

WANTED.—AN AUTOMATIC LATHE FOR TURNING Handles for Buckets, &c. JAS. S. HANN & CO., Cincinnati, Ohio. 7 3*

A VALUABLE PATENT FOR SALE. ADDRESS S. M. GOFF, East Addison, Addison county, Vt. 7 6*

THE RIGHT TO MANUFACTURE THE ST. CLAIR Harvester and my Patent Grain Drill, can be had on easy terms. W. P. PENN, Belleville, Ill. 7 6*

BRASS PINION WIRE FOR GAS AND WATER Meter-makers made by PETER COLLIE, Clock Maker, No. 1,176 South 11th street, Philadelphia, Pa. Also Indicators for counting the revolutions of Machinery. Electric Telegraph Instruments of any kind of fine brass. Wheel works made to pattern. 7 7*

TO OVAL FRAME MANUFACTURERS.—WE CALL attention to a very superior Patented Eccentric Lathe and Machine for cutting oval and circular frames. For Machines and rights to use apply to ROBERT MARCHER & BRO., 221 West 29th street, between 8th and 9th avenues, where they can be seen in operation. 7 4*

MACHINERY.—S. C. HILLS, No. 12 PLATT STREET, New York, dealer in Steam Engines, Boilers, Planers, Lathes, Chucks, Drills, Pumps; Mortising, Tenoning and Sash Machines; Woodworth's and Daniels's Planers, Dick's Punches, Presses and Shears; Cob and Corn Mills; Harrison's Grist Mills; Johnson's Shingle Mills; Belting Oil, &c. 6

AMESSIEURS LES INVENTEURS.—AVIS IMPORTANT Les inventeurs non familiers avec la langue Anglaise, et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront regues en confidence. MUNN & CO.,
Scientific American office, No. 37 Park

VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents:—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them——Importance of the Specification—Who are entitled to Patents—What will prevent the granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

Address MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, No 37 Park Row New York.

THE SEVENTEENTH ANNUAL EXHIBITION OF the Maryland Institute of Baltimore, for the promotion of the Mechanic's Arts, will commence Monday evening, Oct. 3d, and continue to Monday evening, Oct. 31st, 1864. The Hall will be open for the reception of goods on Monday, Sept. 26th. Goods for competition and premium must be deposited before Thursday night, Sept. 29th. Circulars, embracing details, may be had of the Actuary at the Institute. Communications addressed to the undersigned, or to WM. C. CORNTHWAITE, Actuary, will be promptly attended to.
3 11 W. W. MAUGHLAN, Chairman Committee on Exhibition.

FOR SALE BY THE GREAT CENTRAL FAIR, Philadelphia, Pa., one pair Ericsson Caloric Engines, 24-inch cylinders, suitable for a printing office. Price $1,500. Inquire of J. F. MORRIS TOWNE, & CO., Philadelphia, Pa.; or S. V. MERRICK, Philadelphia, Pa. 3 6

ENGINEERING, CIVIL AND MILITARY; CHEMISTRY, Metallurgy, Assaying, &c., at Union College, Schenectady, N. Y. For Circular address Registrar. 24 1y*

SAVING OF FUEL TO PARTIES USING STEAM. DAMPER REGULATORS.
Guaranteed to effect a great saving in fuel and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms of flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, No. 5 Park Place, New York 3 26*

HEYER'S POCKET SEWING MACHINE.—ILLUSTRATED in No. 5, current volume, SCIENTIFIC AMERICAN. State and County Rights for sale. Address W. D. HEYER, Box 762, New Orleans, La. 5 4*

ENGINEERS AND MACHINISTS WANTED FOR the United States Navy. Positions guaranteed before the 1st of September. Address, with two stamps, J. HARRIS, 355 North 10th street, Philadelphia. 6 6*

FOR SALE.—ONE PULLEY, 80 INCHES DIAMETER, 24-inch face, bored for 3⅞-inch shaft. Apply to "Providence Tool Company," Providence, R. I. 4 tf

NOTICE.—PARTIES HAVING EITHER AN IMproved Thrashing Machine, Farm Mill, or Cotton Gin to be introduced, may address "Patent Horse-power Company," 1,509 Pennsylvania avenue, Philadelphia. 4 6*

PLATINA PLATE AND WIRE.—IMPORTED AND for sale by SAMUEL S. WHITE, Dental Depot, 658 Broadway, New York. 5 4*

NERVOUS DISEASES AND PHYSICAL DEBILITY, arising from Specific causes in both sexes—new and reliable treatment, in Reports of the Howard Association—sent in sealed letter envelopes, free of charge. Address Dr. J. SKILLIN HOUGHTON Howard Association, No. 2 South Ninth street, Philadelphia, Pa. 1 13*

POWER LOOMS FOR SALE.—SIXTEEN SATINETT Looms, together with lot of pulleys and hangers. Manufactured by Alfred Jenks & Son. Address LOCK, Box 70, Lexington, Ky. 4 7*

IRON PLANERS, ENGINE LATHES, DRILLS AND other machinists' tools, of superior quality, on hand and finishing, for sale low. For description and price address NEW HAVEN MANUFACTURING COMPANY, New Haven, Conn. 1tf

HOLSKE & KNEELAND, MODEL MAKERS. PATENT Office Models, Working Models, and Experimental Machinery, made to order at 103 Walker street, between Center and Elm, New York. Refer to Munn & Co., SCIENTIFIC AMERICAN Office. 1tf

MANUFACTURERS OF STEAM ENGINES, WITH the link motion, variable cut off of the most approved construction; also Lathes, Mill-gearing, Shafting, Hangers and Machinery in general. Address M. & T. SAULT, New Haven, Conn. 19 26*

GUN AND PISTOL SCREWS.—COMSTOCK, LYON & CO., Manufacturers (Office, 74 Beekman street, New York), are always prepared to furnish Gun and Pistol Screws to sample. Screws to fit the U. S. Musket, Sewing Machine Screws, and Metal Screws generally, of the best quality, at short notice. 10 26*

REYNOLDS' TURBINE WATER WHEELS.—COMPETENT men are employed to measure streams, make plans, and put in flumes, wheels, and gearing. TALLCOT & UNDERHILL, No. 170 Broadway, New York. 1y tf

THEYSON & OGG, 39 GREENE STREET, NEAR Grand street, Machinists, Brass Finishers, and Model Makers Experimental Machinery, Indicators, Reg sters, and Steam Gages of any kind accurately and promptly made. 22 13*

Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu adressiren an

Munn & Co.,
37 Park Row, New-York.

Auf der Office wird deutsch gesprochen.
Daselbst ist zu haben:

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nebst den Regeln und der Geschäftsordnung der Patent-Office und Anleitungen für den Erfinder, um sich Patente zu sichern, in den Ver. Staaten sowohl als in Europa. Ferner Auszüge aus den Patent-Gesetzen fremder Länder und darauf bezügliche Rathschläge; ebenfalls nützliche Winke für Erfinder und solche, welche patentiren wollen.

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Improved Light Draught Plow.

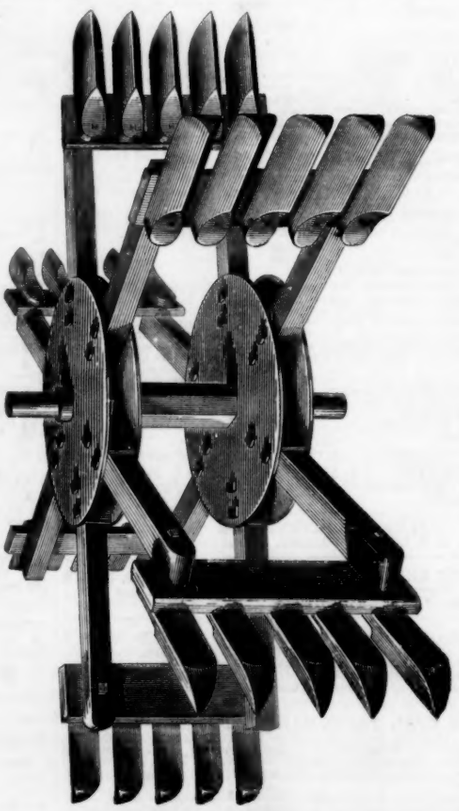
Plows as ordinarily made tax the strength of the team very greatly, and many efforts have been made by ingenious men to reduce the labor and yet maintain the efficiency of the implement. The plow represented in the accompanying engraving is very highly spoken of by farmers who have seen it in operation. Its peculiarity consists in making the mold-board, share, and coulter of a spiral or curved form, so that it enters and leaves the soil with but little friction. The engraving shows two plows capable of cutting ten inch furrows, and the inventor states that the draught is no greater than one 12-inch plow. It has been tried in heavy black muck, and its operation was entirely satisfactory, the furrows turning over and rolling out like chips or shavings from a plane. The inventor asserts that this plow will work with at least one-third less draught than ordinary plows, and that consequently the team can do more work with less fatigue than usual. The curve runs from the point, A, and gradually flares for the whole width of the mold-board up to the top edge. The land-side is also curved, and the furrow turned on the land-side in the trials was left rough and jagged, not pressed hard and smooth, as is generally the case from the friction. The inventor says that this curve is a great advantage, as there is little or no pressure on the land-side; for any other plow with such a curve on the land-side would not stay in the furrow the length of the plow. The entire patent is for sale. The invention was patented through the Scientific American Patent Office, on Jan. 26, 1864, by James Tomlinson, of Racine, Wis.; for further particulars address as above.

TOMLINSON'S LIGHT DRAUGHT PLOW.

Improved Paddle Wheel.

All persons who have watched steamers going out to sea or plowing up the waters of our harbors, must have remarked the immense volume of water which is thrown up behind like furrows, so that she literally plows her way through the water.

The inventor of this wheel claims that the back-water, which absorbs so large a percentage of the power of ordinary water-wheels, is entirely overcome by the arrangement of bucket shown here, and that while it is advantageous in this respect it also furnishes enough surface to obtain the full propulsive effect of the engine. This engraving is made from a small model furnished by the inventor, and the details, such as the manner of fastening the buckets will be changed in large wheels. The general principle, however, will remain the same. It was patented through the Scientific American Patent Agency on Oct. 20, 1863, by Leonard Ames, of Waubeck, Wis.; for further information address him at that place.



AMES'S PADDLE WHEEL.

Great Silver-lead Mine in Wales.

The London *Mining Journal* says:—"We have occasionally directed attention to this ancient and extensive silver-lead works, in Cardiganshire, as being vigorously re-opened, and approaching a state of great productiveness. Time was when this was a mine of such importance that the copper mines of Cornwall working with it contemporaneously absorbed even less of public interest, and when the energy of the nation, and the attention of the Queen herself, were addressed to establishing this and Cwmsymlog as national enterprises. Queen Elizabeth sent to Germany for miners; indeed, with all the skill of that age, a German of the name of Hughsetter, in the quaint phrase of the day termed an exceedingly cunning workman, was brought over to use his best practical ability upon it. We are not acquainted with what his skill produced, any further than that the proceeds of the two mines were then said to equal a profit of £25,000 a-year. Whatever might have been the nature of the works undertaken then, the present workings are steadily proceeding below them. The engine-shaft is now sunk to a depth of fifteen fathoms below the old workings, on the eastern side of the Darren Hill, and the fifteen fathoms level has been carried westward three fathoms towards the rich ore ground opened in the levels above. The walls for a new drawing-machine (the ironwork for which is delivered on the spot) are fast approaching completion, and the machine will be fixed and at work, with moderate success, in a month from this time."

SIMPLE MODE OF PURIFYING WATER.—It is not generally known that pounded alum possesses the property of purifying water. A tablespoonful of pulverized alum sprinkled into a hogshead of water (the water stirred at the same time) will, after a few hours, by precipitating to the bottom the impure particles, so purify it that it will be found to possess nearly all the freshness and clearness of the finest spring water. A pailful containing four gallons, may be purified by a single teaspoonful of the alum.

FROM THE STEAM PRESS OF JOHN A. GRAY & GREEN.